aste-Testing Report

JULY 1955

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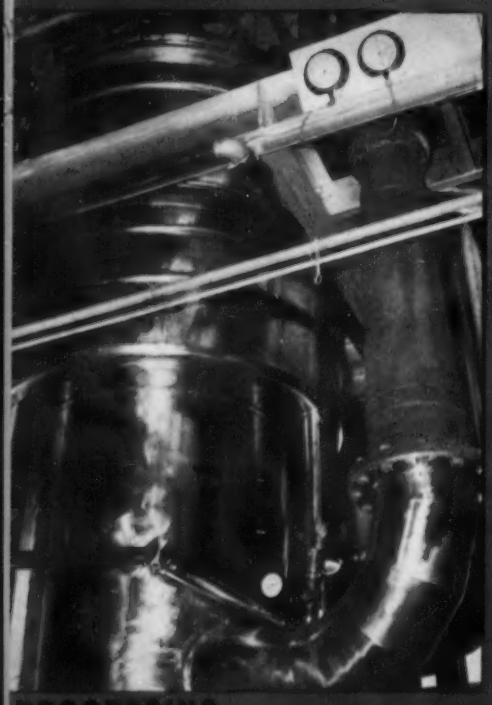
FOOD ENGINEERING

A McGRAW-HILL PUBLICATION



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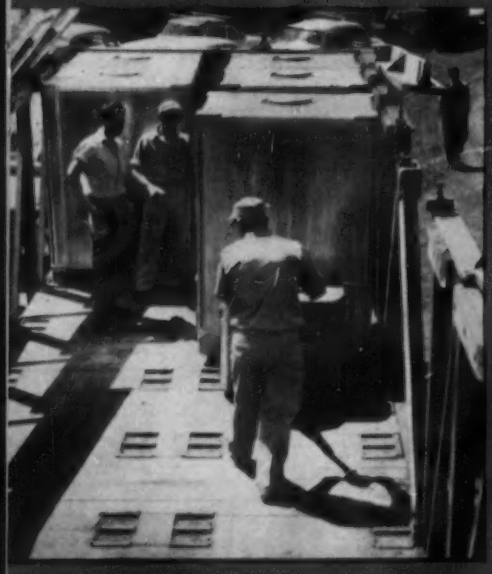

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MATERIALS HANDLING • PRODUCTS • QUALITY CONTROL
INSTRUMENTS • INGREDIENTS • SANITATION

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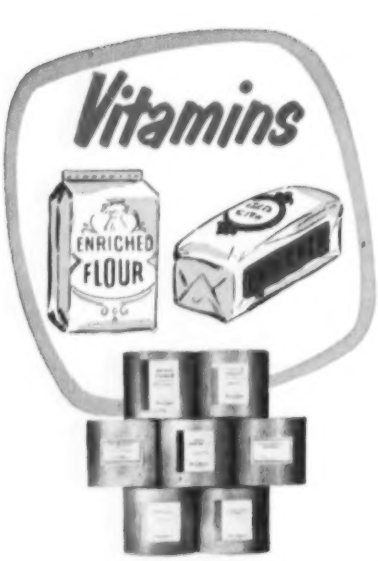

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JULY 1955

Volume 27 Number 7

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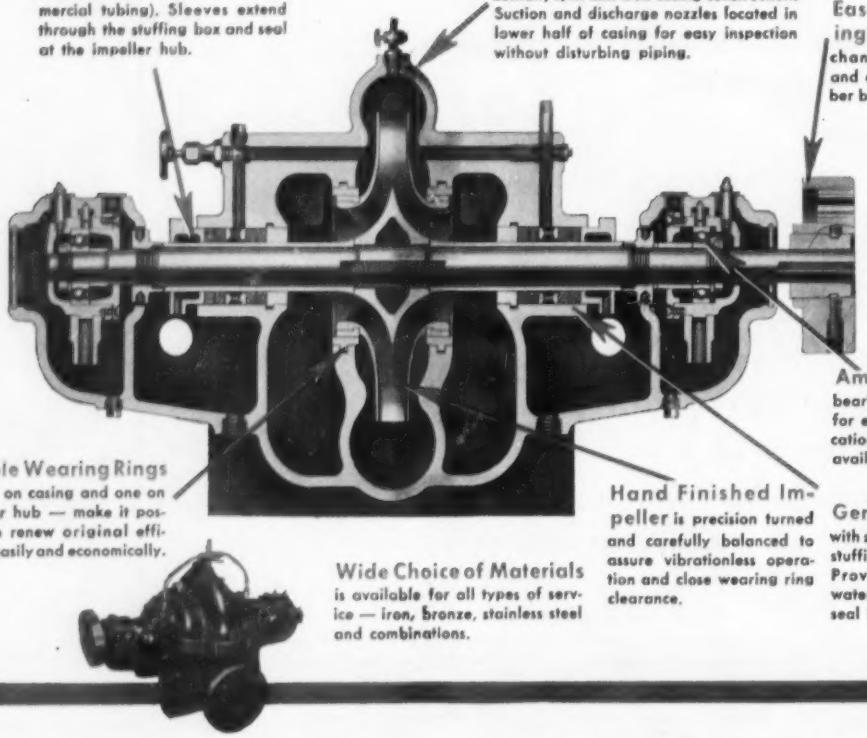
Get 8 Advantages of GOOD PUMP DESIGN

ALLIS-CHALMERS Double-Suction PUMPS



Longer Shaft Sleeve Wear with cast shaft sleeves (not commercial tubing). Sleeves extend through the stuffing box and seal at the impeller hub.

Greater Rigidity with heavy horizontally split cast-iron casing construction. Suction and discharge nozzles located in lower half of casing for easy inspection without disturbing piping.

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Ample Bearings — Ball bearings may be furnished for either oil or grease lubrication. Split shell bearings also available in larger sizes.

Double Wearing Rings — one on casing and one on impeller hub — make it possible to renew original efficiency easily and economically.

Hand Finished Impeller is precision turned and carefully balanced to assure vibrationless operation and close wearing ring clearance.

Generous Stuffing Box with sufficient packing to keep stuffing box maintenance low. Provision made for sealing water connection or grease seal if required.

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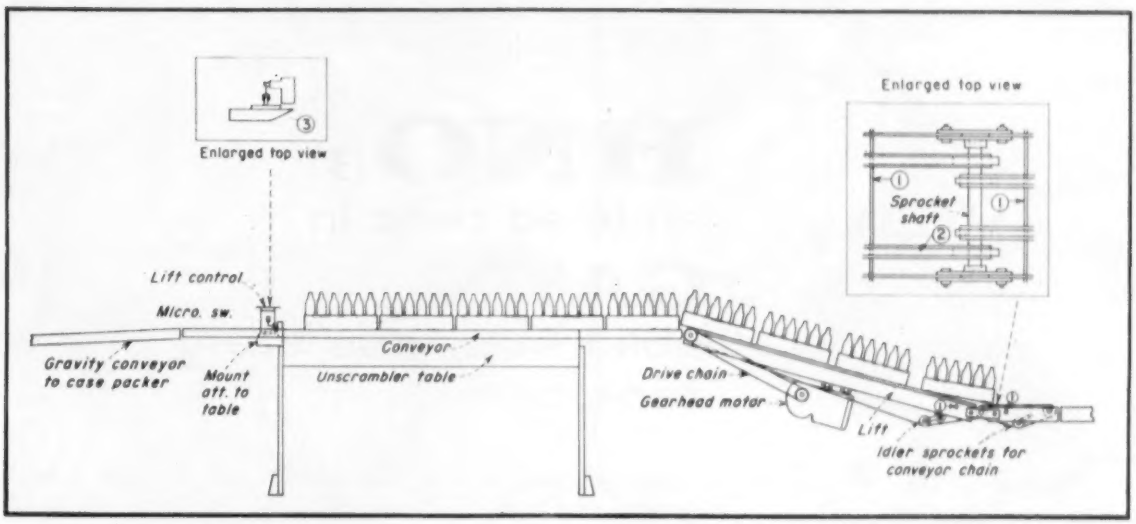
A-4590

ALLIS-CHALMERS

PRACTICAL IDEAS



Conveyor Jamming Reduced

By feeding bottles to a washer more efficiently, we reduced down-time in our bottling operation and boosted the speed of the line to 350 per min.

Bottles are transferred from cases on a conveyor to an unscrambler table and fed to the washer continuously. Meanwhile, empty cases go to a case packer via gravity conveyor. Key to this system is an automatic control that stops the supply of cases should the unscrambler become overloaded. Following are details of equipment and method used:

We installed a section of skate wheel conveyor (10-ft. long x 1-ft. wide) parallel to the in-feed of the unscrambler table (sketch). As wide as a case, this type of conveyor allows the operator to stand close to his work.

To minimize transfer distance, we placed the conveyor in a level position 4 in. below the top of the unscrambler table. With this arrangement, the top of a case on the conveyor and the table top are about equal in elevation.

Cases of empty bottles are pushed along this section of the conveyor by a lift made from a roller conveyor frame. Referring to enlarged top view, rollers were removed and roller shafts (1) were adapted to support guides in which the "S6X" block chain (2) travels.

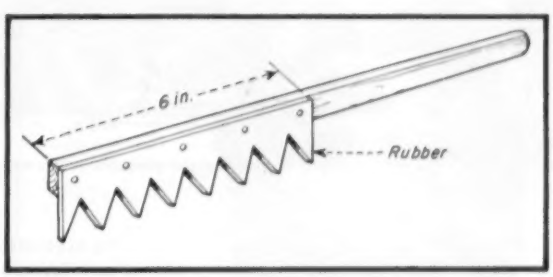
This chain was used, rather than a rubber or leather belt, because it produces less friction at the bottom of the case. This makes case jams easy to break and decreases bottle breakage. Furthermore, reduced friction permits operator to hold the cases back if necessary.

Full cases move along the conveyor to the transfer point at the slowest speed needed to keep the washer supplied. Here, bottles are easily taken from their cases and placed on the unscrambler table by one operator using conventional bottle lifters.

If a jam develops, however, the supply of cases must be stopped quickly, otherwise cases will go on to the packer without being unloaded. Synchronizing the speed of the conveyor with the capacity of the unscrambler table is the fundamental factor in this system. And that's where the automatic control comes into play.

Referring again to enlarged top view, when full cases pile up on the conveyor, a bottle in the case (on the side toward the table) actuates a limit switch by exerting pressure at (3). This stops the lift at once and prevents the unloaded cases from moving on.

When the unscrambler table is clear, operator starts the lift by merely removing the bottle in contact with the limit switch.—*A. J. Morgan, Jr., Norfolk Coca-Cola Bottling Works, Norfolk, Va.*



How To Decorate Ice Cream Pie

Select a piece of pliable squeegee rubber about 6 to 8 in. in length according to size of pie to be decorated. Now with a pocket knife cut a series of teeth in the rubber (see sketch). Depth of the teeth as well as

FOOD ENGINEERING
(Formerly Food Industries)
July 1955 Vol. 27, No. 7

Published monthly by the McGraw-Hill Publishing Co., Inc.
Executive, Editorial, Advertising, and Subscription Offices: McGraw-Hill Building, 330 W. 42nd St., New York 36, N. Y. Publication Office, 99-129 N. Broadway, Albany 1, N. Y.; entered as second class matter at Post Office at Albany, N. Y.

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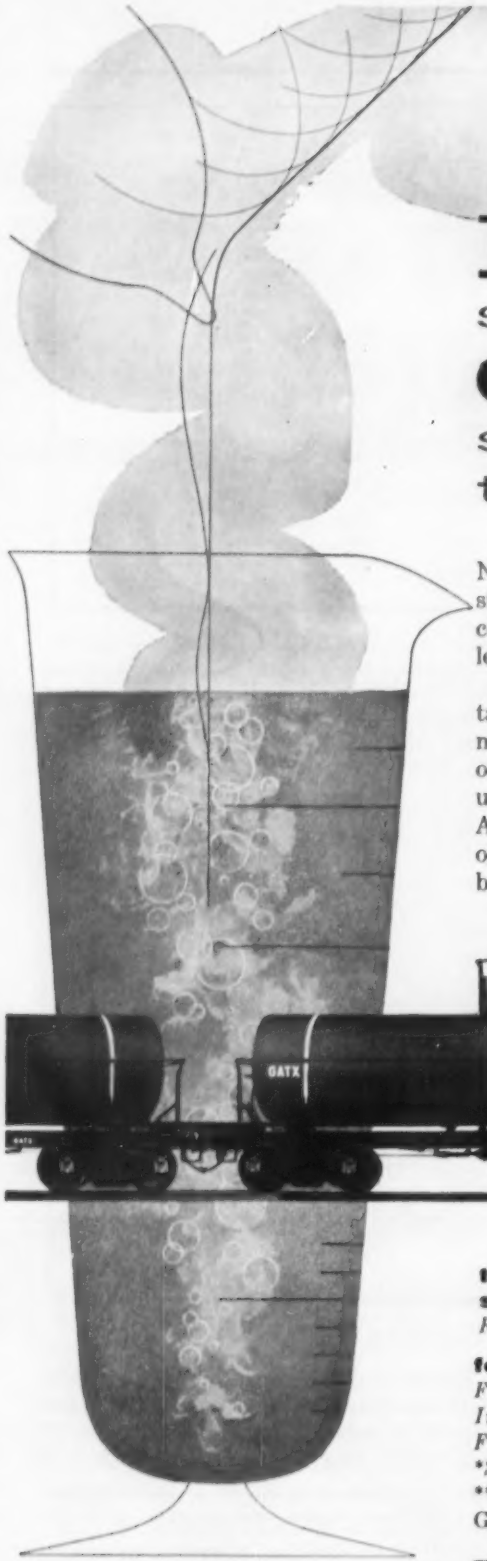
For subscriptions, write to Food Engineering Subscription Service, 330 W. 42nd St., New York 36, N. Y. **Order must indicate company and position. Allow one month for change of address.**

Subscriptions are solicited only from the executives, engineers, and technologists in food processing plants.

Single copies 35¢. Subscription rates—U. S. and possessions and Canada, $2 for 1 yr., $3 for 2 yr., $4 for 3 yr. Other Western Hemisphere countries and Philippines, $10 for 1 yr., $15 for 2 yr., $20 for 3 yr. All other countries, $15 for 1 yr., $25 for 2 yr., $30 for 3 yr.



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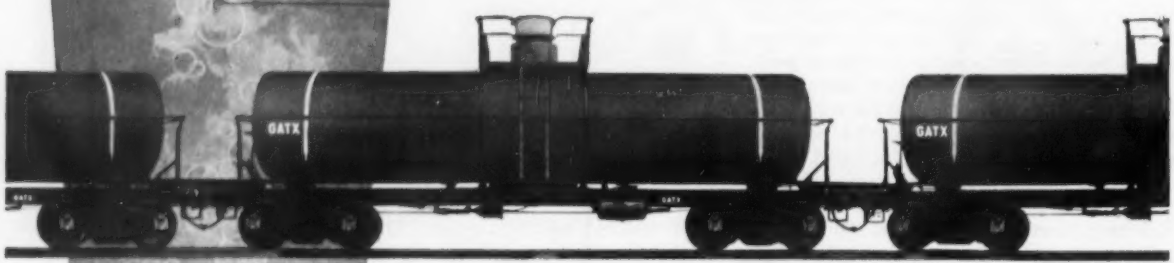

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width of rubber will be determined by size of pie and decoration. The deeper the teeth the more pronounced will be the decoration on the finished pie; although it is not necessary a handle made of wood can easily be attached to the rubber squeegee.

Now fill paper pie plates direct from ice cream freezer, and then with ice cream at the desired consistency use decorator in a sweeping motion entirely around pie. This will give a fine decorative appearance to the product.—*Donald J Binder, Manager, Binder Bros, Inc, Yankton, S. D.*

Nut And Bolt Tightening

The maintenance shop often has to erect structures of large sheets of cladding material secured to angle iron. The sheets may consist of steel and other materials, and nuts and bolts are popular holding devices.

Tightening nuts is often a two-man job; one man holds the bolt head against turning on one side of the wall while the other tightens the nut on the other side with a wrench. The bolt-holder can be dispensed with if the technique illustrated in the photograph is adopted.

Before assembling, the end of each bolt thread is split diametrically by a saw cut for depth of about $\frac{1}{8}$ in. Slot can be cut quickly with about four strokes of a coarse toothed hacksaw blade. The bolts are inserted through the hole in the wall and then the one man goes around to the other side and slips on the nuts. By inserting a screw driver in the bolt slot and operating the wrench with other hand, he can prevent bolt from turning while tightening the nut.—*C. T. Bower, Tool Engineer, London.*

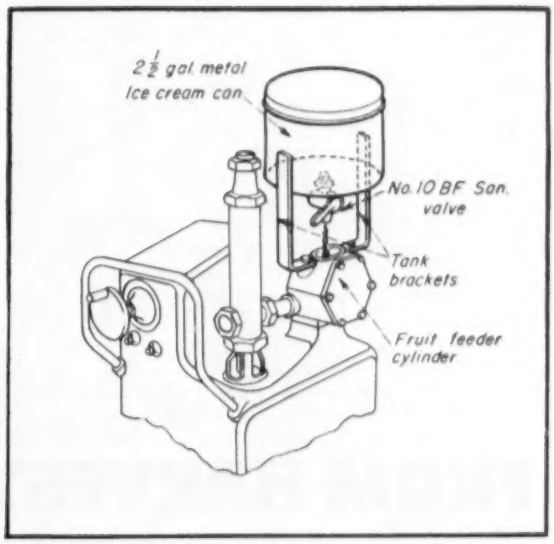
Vac Trick Ends Foam Trouble

Here is an idea that worked in our lab.

In the determination of sugar content of strawberry jams, procedure requires that jam be blended with water in a Waring Blendor. This creates lots of foam which does not subside even on addition of caproic alcohol. The foam makes it practically impossible to make the blend up to a specific volume with any degree of accuracy.

This problem was solved by drawing a vacuum on the blend in a suction flask and then suddenly releasing the vacuum. If necessary, this procedure may be repeated.

In this way, all foam difficulties are eliminated in making exact dilutions.—*Ed Teeny, Food Technology Dept., Oregon State College, Corvallis, Oregon.*

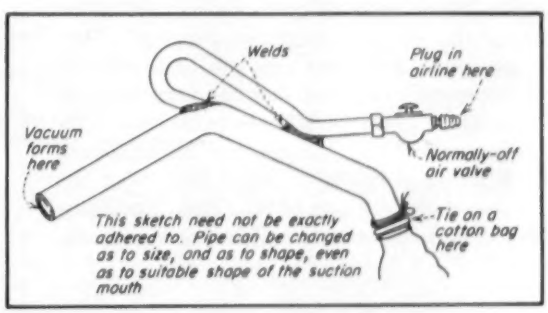


Makes "Chocolate Bit" Ice Cream

A fruit feeder can be used to make "chocolate bit" ice cream by removing the conventional hopper and fitting a standard metal ice cream can to the studs with brackets, then attaching a 1 in. No. 10 BF sanitary valve.

In starting up, a steam hose is used to initially heat the outside of the sanitary valve so it will not chill the chocolate passing through. Melted slab chocolate is then added to cannister, at about 105 deg. F., from a can kept on a separate hot plate at about 110 deg. The sanitary valve is opened to feed the desired amount of chocolate directly to the rotor of the fruit feeder.

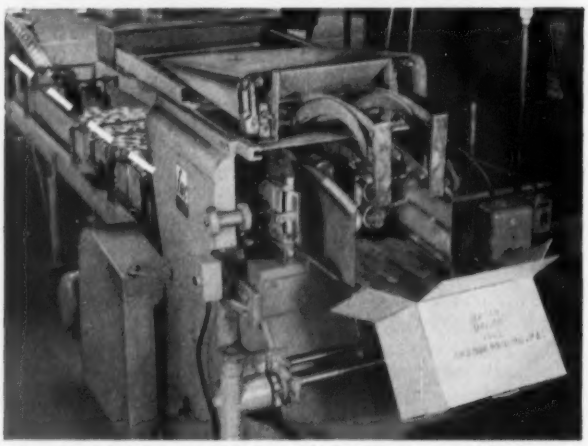
Prior to introducing the chocolate, about 10 gal. of ice cream is put through the fruit feeder to chill the rotor. The hot chocolate dropping on the cold rotor of the fruit feeder immediately solidifies to a thin coating on the pump rotor and is then pushed into the ice cream stream, being broken up by the pistons in the rotor. Only two pistons are used, with two blanked off. At top speed it nicely handles the volume of a VS 200 gal. Vogt freezer. Variation can be made in the amount of chocolate fed to the fruit feeder to suit trade desires.—*Cherry Burrell Circle, Cherry Burrell Corp., Chicago.*


Welds
Plug in airline here
Vacuum forms here
Normally-off air valve
This sketch need not be exactly adhered to. Pipe can be changed as to size, and as to shape, even as to suitable shape of the suction mouth
Tie on a cotton bag here

Home-Made Vacuum Pick-Up

Here is a simple easily-made vacuum cleaner that can be fabricated from scrapped tubing and employed in any plant where compressed air is available. It is an ideal arrangement for cleaning corners and deep channels. This little gadget is a great boon to good housekeeping programs which in any plant lowers accident hazard.—*Safety Newsletter, National Safety Council, Chicago.*

FROM HARVESTING TO CASING



FMC "Stalk to Storage" Corn Equipment Produces a Higher Yield—Delivers a Quality Pack

FMC has virtually grown up with – and in – the corn canning industry, helping it grow through continuous contributions of research and modern equipment development. Many of the industry's achievements – its supremely high standard of quality, its ability to produce in enormous volume – are the direct results of this long and fruitful partnership. Today you'll find FMC *specialized* "Stalk to Storage" corn equipment in every corn canning plant in the country, many of which are completely FMC equipped. And every year you'll find new and improved equipment that has been carefully designed to do specific jobs better, faster, for greater profit for you. Some of this equipment is shown or briefly described here. Your line should also include FMC Fillers, Sterilizers, Labelers and other Can Handling Equipment.

Above: **The FMC SWEET CORN HARVESTER** *gets all the corn in the field, produces corn for canners, freezers, even for the cob-corn market! It replaces a hand-picking crew of 10 and at greater yield.*

Below: **FMC's NON-SHOCK CASER** *automatically cases cans fast (up to 1,200 cases per hr.)—limited only by the speed of the operator It's gentle to cans, labels and products, cuts costs.*

OTHER FMC CORN HANDLING EQUIPMENT

- **FMC PEERLESS CORN WASHER** tumbles, scrubs and rubs ears together under high pressure water sprays. Removes all loose husks, silk and dirt.
- **FMC DOUBLE HUSKER** cleanly trims butts and strips husks at 2½ tons of corn an hour. Unequalled for efficiency!
- **FMC EAR CORN SILK BRUSHER,** with its brushes spinning at high speed, washes and scrubs every row of kernels of every ear, removing all silk. The larger handles output of 20 FMC Huskers; the smaller, that of 8 Huskers.
- **FMC UNIVERSAL ROTARY CORN CUTTER**—a key machine in any corn line for maximum recovery of kernels from the cob, for cream style or whole grain packs. Up to 120 ears per minute depending on operator's skill.
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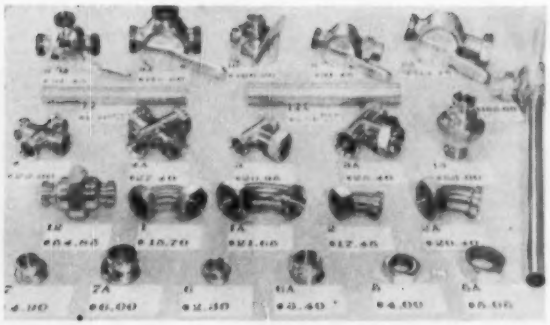


Display Promotes Cost Awareness

To stimulate appreciation among plant operating personnel of the cost and value of stainless steel fittings, Abbotts Dairies, Inc., Philadelphia, arranged a display (see photo) showing fittings accompanied by "price tags."

Reproduced in the company's employee magazine, "Abbott's Family News", the photograph was accompanied in part by these paragraphs.

"Look at the picture above. It shows 22 small pieces of hardware without which the pasteurizer, homogenizer, cooler, and holding tanks could not operate.

"One small two-way valve costs $91.45. It doesn't look that valuable—but it is. The more valves and other fittings we have to buy for our plants, the higher the costs of operating will rise. It is every employee's duty to help keep these costs down.

"Be careful with your company's equipment—especially those things which are small and easily overlooked.

"Plant equipment should be handled carefully at all times—particularly during dismantling, washing and assembling.

"Study the picture again and resolve to be careful and considerate of the tools you handle in your job."

A short time after the publication had been distributed a small number of the workers were interviewed to determine results of the promotion.

Eight out of ten had read the article in the employee magazine. Of these, half did not realize equipment was so expensive. Of the remaining four who had read the article, one said he knew the equipment was costly, but was surprised just how expensive it was. A second had had a short course in dairying so had some idea of cost. A third was an old-timer, while the fourth had been told costs by a former foreman.

Half of those interviewed said the article made them more conscious that equipment required careful handling. Others inferred that since they knew the true value of the equipment, they were always careful.—*FE Staff*

Plastic Floor Markers

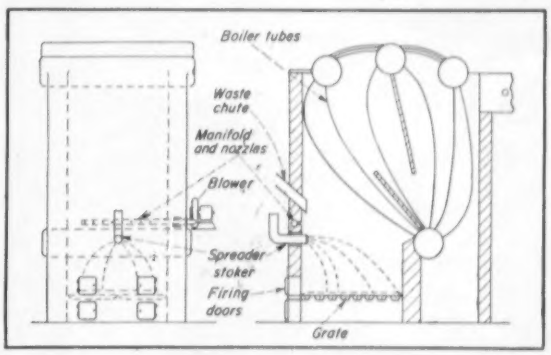
Many General Foods plants are painting warning stripes on their floors to designate traffic aisles, fire aisles, or other limitations. Three solid colors—white, yellow, or black—have been used frequently in the past. Recently, however, a black diagonal strip on a bright yellow background, an effective vehicular traffic regulator, has found its way into factories. This combination and arrangement of colors stimulates reflexes and seems a logical means of designating areas in plants.

Of course, it would be very expensive to chalkline a warning strip, then brush-paint yellow as a base coat and finally brush-paint black diagonals. Modern plastics, however, of the polyvinyl and acetate classifications have solved the problem. Ready-to-apply stripes have proven many times more durable than paint and especially adaptable for concrete floors.

These stripes come in a roll with protective backing. When pulled free of backing, the adhesive under surface of stripe can be applied to floor immediately. No chalkline is necessary for positioning plastic stripe. Furthermore, only a few removable markers need be used to define the location of the stripe as it is unwound from the roll.

Are these plastic diagonal stripes more effective and efficient than usual one-color warning stripes? The answer is, yes, on several counts. First, they contribute to the safety of plant employees. A person doesn't usually cross a yellow-black diagonal without glancing about him. And, if a motorized pallet truck, say, is bearing down on him, his reflexes, stimulated by the warning stripe are tuned to prevent an accident. Then painted stripes are not designed to withstand traffic—truck tires, human footsteps or piled goods. Plastic stripes, on the other hand, are said to outlast painted stripes 5 to 1. And paint doesn't penetrate and adhere to concrete floors in many food plants.

Several types of plastic stripes are available from various manufacturers, among them West Line Products Div., of Western Lithograph Co., or W. H. Brady Co. of Milwaukee, Wis.—*G. F. Technical Bulletin, General Foods Corp., White Plains, N. Y.*



Novel Smoke-Control System

Practical low-cost smoke control on coal fired boilers has been achieved with a system that almost any food manufacturer can afford to duplicate. The system, called an over-fire air system, consists of a blower and a set of nozzles carefully placed inside burners for proper distribution of secondary air over fuel bed whenever excessive smoke starts to develop. The system is operated by photoelectric unit which senses smoke density above the allowable minimum.

Employed is a manifold (see sketch) located in bridge wall facing charging doors or extended around side of the firebox to insure proper air volume and distribution.

Extending from manifold are nozzles ranging from ¾ in. to 1¼ in. diameter, which are directed in toward firing chamber at centerline distances of 6 to 12 in.

Installations will require different nozzle velocity depending on such factors as type of fuel, type of firing equipment and furnace dimensions. The length of the nozzle should never be more than seven times its inside diameter and not less than three times the i.d.

The nozzle tubes are recessed about 1 in. inside refractory wall of the firing chamber. Resulting short tunnel induces good air turbulence and protects metal of the nozzle from heat of the furnace. Manifold and nozzles should be assembled by welding for greater

B. F. Goodrich announces

This easy-to-clean belt good for 85% of all food-handling jobs

THAT belt the cake is riding on is the most useful conveyor belt made for the food industry. It's the B. F. Goodrich Highseal, built to handle 85 out of every 100 food-handling jobs, and last longer doing them.

The first thing you'll notice about the Highseal belt is its attractive green color. Lighting experts call it "eye-rest" green because it reduces glare and eyestrain. And the color is not just a thin top coating, it's used throughout the belt and will last as long as the belt itself.

A new rubber compound gives this B. F. Goodrich belt good resistance to food acids, most greases, fats and alkalies. It can handle cold products down to zero, as well as hot ones up to 212°. Food particles can't grind into Highseal's smooth, polished surface. That's why it's so easy to clean. Oily foods, sticky icings, even scuff marks from banging pans, wipe right off with a damp cloth. Many users report that Highseal has cut their clean-up time in half.

Another new belt, developed by B. F. Goodrich for food handling, is the tan Koroseal belt that has the highest resistance to oil and grease of any belt made today. What's more, it stands hard use, rough handling and just about everything else that ruins most materials.

Find out more about these longer-lasting, work-saving belts for food handling. Let your B. F. Goodrich distributor show you samples and give you more information. *The B. F. Goodrich Company, Dept. M-436, Akron 18, Ohio.*

Koroseal—T. M. Reg. U. S. Pat. Off.

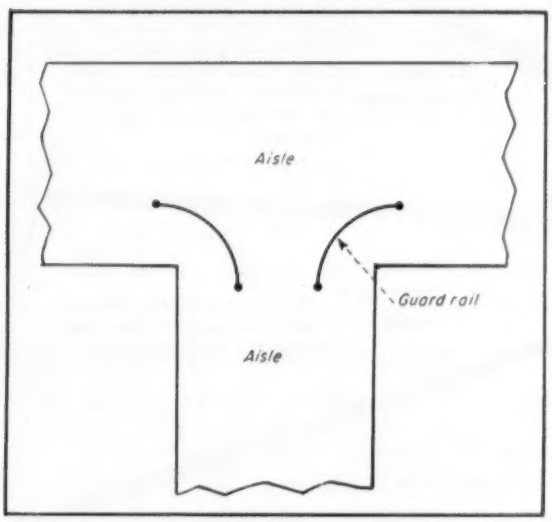
B.F. Goodrich
INDUSTRIAL PRODUCTS DIVISION

rigidity although threaded assembly is satisfactory. Slip couplings are also recommended on all connective tubing to simplify assembly and reduce installation cost.

A photocell actuates a Lamson Company blower which provides additional air for combustion when heavy smoke is threatened. This cell is "zeroed" to tolerate the stack haze normal for satisfactory furnace operation. When this haze density increases—a condition which always precedes the formation of objectionable smoke concentration—the cell starts the blower through a sequencing timer.

The timer may be set to keep the system running continuously for any period of from 10 sec. to 5½ min. This arrangement insures that the blower will operate long enough to eliminate the incipient smoke conditions completely and prevent rapid stifling of the system.

Furthermore, if at the end of a preset cycle the stack haze has not diminished to a satisfactory level, the photocell automatically starts the timer on another cycle without shutting down the blower. Thus, the system will not "hunt" and overwork motor and controls by frequent stops and starts.

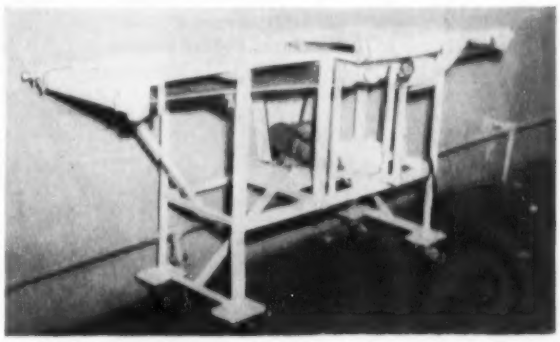


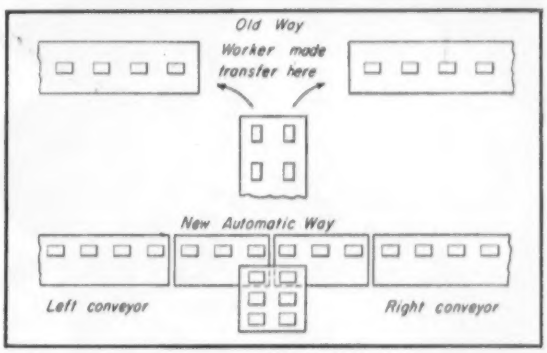
Safety Rails at Intersections

With the large number of industrial power trucks moving through the aisles of modern food plants, there is ever present the hazard of collision with employees walking in the aisles. This hazard is particularly severe at aisle intersections where walls block out the view.

So, to protect workers walking around corners at such intersections, Kroger Food Co. has installed curved guard rails at the corners. Made of 1½-in. pipe, these rails are mounted about 30 in. away from the wall, leaving enough space for people to walk between them and the wall. The rails are curved around the corner, so that they are the same distance from the wall at all points.

Two vertical pipes at the ends of the safety rail support two horizintal pipes, one at the top being about waist high, the other half way to the floor. The vertical pipes are anchored to the floor with bolts. And the rails which are painted white so that they may be seen easily by the truck drivers extend about 3 ft. on either side of the corner.—*FE Staff.*





Improved Cake Handling

Formerly, one of our bakery operations required that a worker manually transfer a double line of cakes from the end of one conveyor to two other conveyors going to left and right. But now with construction of one three-way conveyor mounted on casters, the whole operation is made automatic.

The three-way conveyor is wheeled on the casters to the working position. After plugging in for current, a small motor operates the feed-source conveyor and a larger motor with reduction gear runs the two longer conveyors.

The conveyor on the right is rigid, while the one on the left is hinged at the nearer upright and supported by a removable brace permitting anyone to lower it and pass across the production line (photo).—*Walter J. Holmes, American Bakeries, Inc., Jacksonville, Fla.*

CAN YOU USE $50?

Then here's an opportunity to get it.

Send one of your ideas to FOOD ENGINEERING.

Each month $50 is presented to someone like you for the best item in this department. And the chance that it will be you is now running about one in twelve.

Also $5 to $15 is paid for each contributed item used. So a few minutes time may net you as high as $65.

Just send us the facts about your idea and its application. And include a free-hand sketch or snapshot to illustrate it.

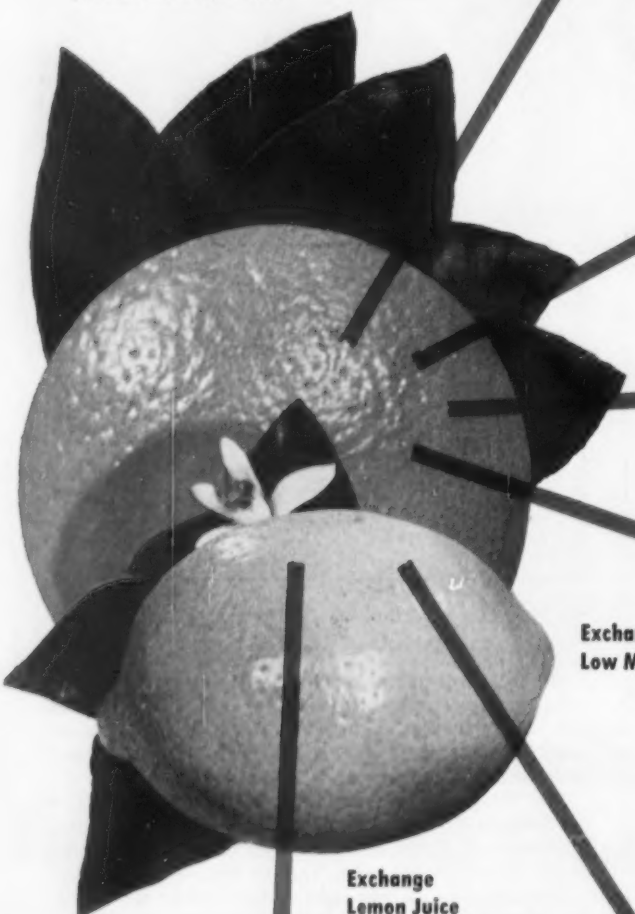
We'll do the finished writing and drawing for you.

Send it today, before you forget. Address it to Practical Ideas Editor, FOOD ENGINEERING, 330 W. 42nd St., New York 36, N. Y.—The Editors

MAY PRACTICAL IDEA WINNER was "Simple Continuity Tester," submitted by Edgar R. Woodman, Plant Engineer, Snow Flake Canning Co., Brunswick, Me.

Look to Sunkist
for progressive research in food processing

Yes, in every field of food processing, the Sunkist Growers laboratories are making ever-widening contributions to the increased quality of food products. Here are some typical Exchange Brand product developments.



Exchange Oil of Orange

Always consistent, always outstanding in flavor, strength and aroma. An essence you can rely on. Made from fruit grown in the famous Sunkist groves of California.

Exchange Oil of Lemon

The 4-to-1 favorite over all other lemon oils combined! The reason is the superior flavor that comes only from California-grown lemons processed by exacting Sunkist standards.

Exchange Preserver's Pectin

Here is *even* jell strength that gives you consistent, complete reliability in setting control.

Exchange Low Methoxyl Pectin

A natural fruit pectin that jells without sugar. Completely tasteless, permitting the use of the most delicate flavors. Pies made with Exchange Low Methoxyl Pectin won't "run" or "weep" when cut—and you have never tasted such natural juicy fruit flavor. Famous too for aspics, jellied fruit or vegetable salads, dietetic preserves or non-sugar jells.

Exchange Lemon Juice

Nothing can match lemon juice for bringing out the natural flavor of *any* food product. It's a superior acidulant in the preparation of mayonnaise, fruit cocktail, figs, fruit nectar, prunes and other heavy-syrup products. Highly effective as an anti-oxidant in processing frozen foods. Citric acid molecules have also been established as effective in the retarding of mold growth. Available in concentrated or single strength form.

Sunkist Growers

Exchange ®

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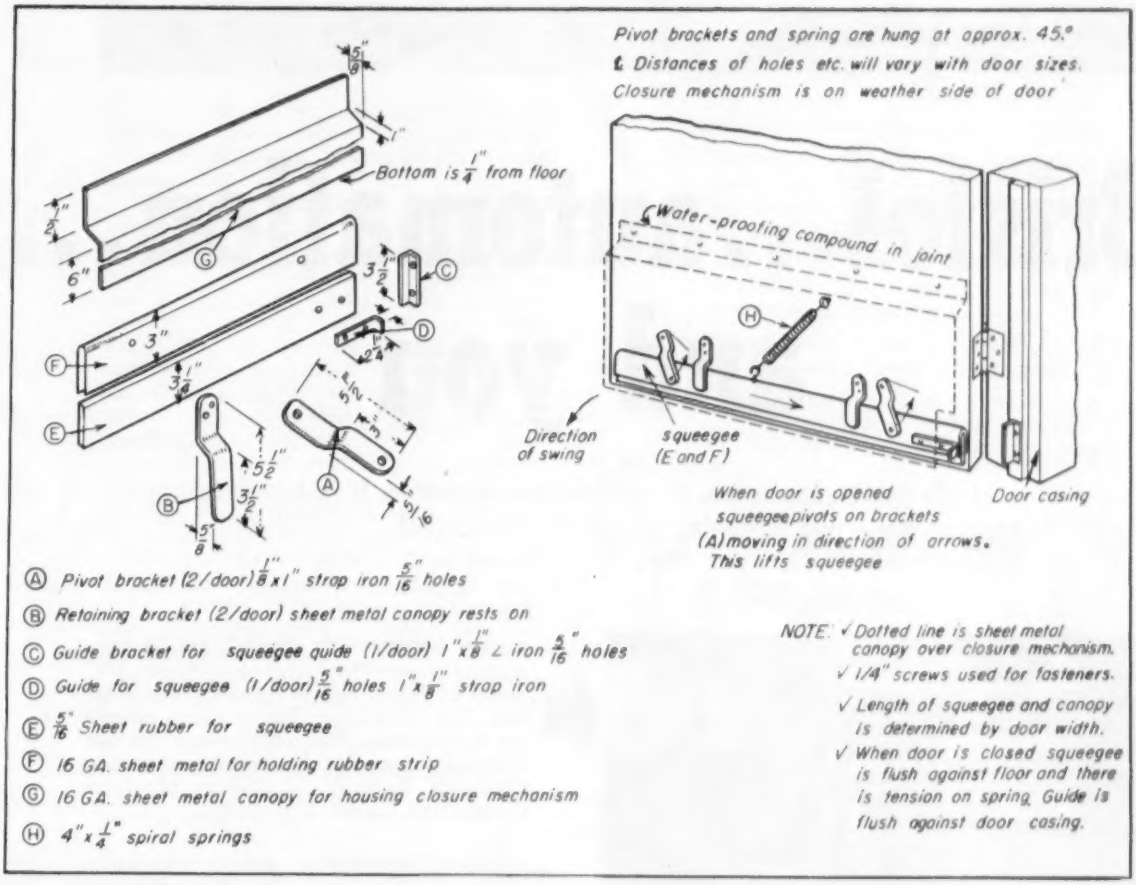
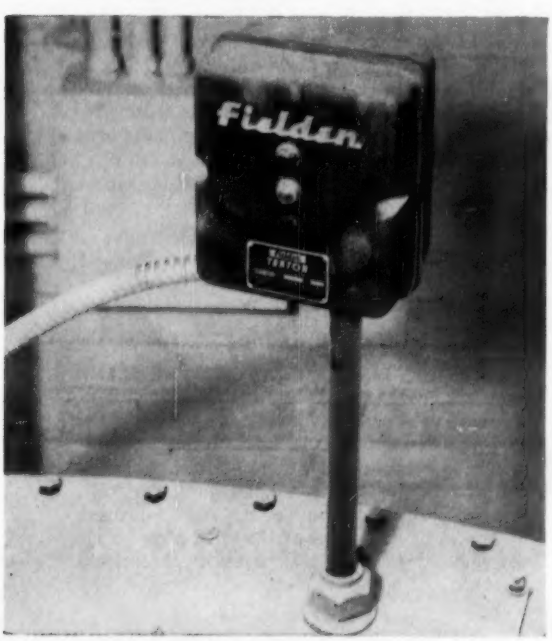

Pivot brackets and spring are hung at approx. 45°
† Distances of holes etc. will vary with door sizes. Closure mechanism is on weather side of door
Bottom is 1/4" from floor
Water-proofing compound in joint
Direction of swing
squeegee (E and F)
When door is opened squeegee pivots on brackets (A) moving in direction of arrows. This lifts squeegee
Door casing
Ⓐ Pivot bracket (2/door) 1/8" x 1" strap iron 5/16" holes
Ⓑ Retaining bracket (2/door) sheet metal canopy rests on
Ⓒ Guide bracket for squeegee guide (1/door) 1" x 1/8" ∠ iron 5/16" holes
Ⓓ Guide for squeegee (1/door) 5/16" holes 1" x 1/8" strap iron
Ⓔ 5/16" Sheet rubber for squeegee
Ⓕ 16 GA. sheet metal for holding rubber strip
Ⓖ 16 GA. sheet metal canopy for housing closure mechanism
Ⓗ 4" x 1/4" spiral springs
NOTE: ✓ Dotted line is sheet metal canopy over closure mechanism.
✓ 1/4" screws used for fasteners.
✓ Length of squeegee and canopy is determined by door width.
✓ When door is closed squeegee is flush against floor and there is tension on spring. Guide is flush against door casing.

Seal for Bottom of Outside Door

Here are detailed instructions for construction of a strip which seals the space between an outside door and the door sill or floor, and which lifts as the door is opened.

When the door moves in the squeegee is lifted out of the way. When the door closes, the squeegee is forced down against the floor or sill to provide a weather-tight seal. Contrivance was designed by Ralston Purina Co., St. Louis.



Level Control for Drys

Employed at Awrey Bakeries, Inc., Detroit, to control level of flour in holding tanks is a new type electronic instrument. Due to light, fluffy and non-conductive nature of flour, other types of level controlled equipment have proved less satisfactory. The electronic device selected is not dependent upon conductivity nor on weight of the material measured. The mechanism is actuated electronically by a simple plastic covered or metal-sensing probe which extends into the tank.

When air surrounding the sensing probe is displaced by material of a higher dielectric (non-conducting) character—in this case flour—a signal is given by the instrument and level control is thereby accomplished.

The new electronic unit (see photo) called a Tektor, contains no moving parts such as floats, diaphragms or rotating paddles to stick or foul from material build-up or accumulation.

Unit, which is easily installed, controls flour levels with an accuracy of ±1%.

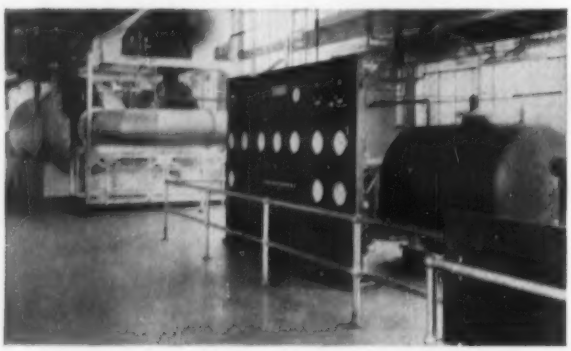
The instruments, which are supplied in a variety of weather-resistant, tight and explosive-proof cases, are not complicated in either construction or operation. Tube required is a standard radio tube available at any radio store.

WHAT'S NEWS AT BRISTOL . . . WHAT'S NEWS AT BRISTOL

Bristol...automation... and you

Magic word, automation. Or push-button operation. It's a breath-taking concept, too — plants running practically unattended.

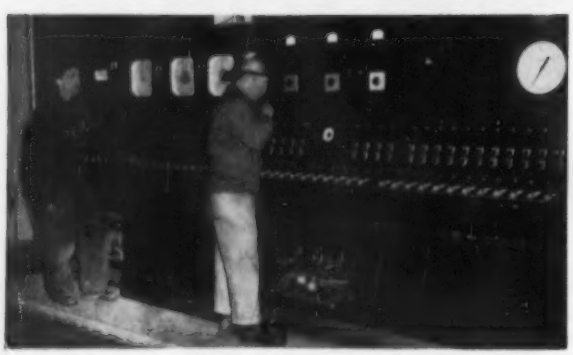
Breath-taking — but not *new*.



BRISTOL COORDINATED CONTROL SYSTEM automatically controls operation of "Columbia" Activated Carbon Solvent Recovery Plant at the New York Daily News. Similar control systems are used in many other solvent recovery plants designed and supplied by Carbide and Carbon Chemicals Company, a Division of Union Carbide and Carbon Corporation.

BRISTOL'S "MECHANICAL BRAIN" is the leader of the Coordinated Process Control System . . . accurately coordinating all the variables, including mechanical operations, so that each phase of the process takes place in proper sequence.

AUTOMATION is often thought of in terms of plans or even dreams; here at the Buffalo Foam Rubber Products Plant of the Dunlop Tire and Rubber Corporation, it is a reality. This automatic plant, designed and built by Mechanical Handling Systems, Inc., Detroit, uses Bristol Dynamaster® Electronic Instruments and Automatic Controllers as part of a process employing today's most advanced automatic production techniques. The result — greater efficiency and productivity, lower costs, improved product, and stronger competitive position.



THE WORLD'S LARGEST COAL CLEANING PLANT employs automation in lubricating system. The Hanna Coal Co., Adena, Ohio, uses *Bristol Controls and Recorders* in its fully automatic time-controlled centralized system for mass lubrication. This system promotes safety and, above all, insures positive delivery of the right lubricant in the right quantities at the right time to all bearings, regardless of operating conditions.

Twenty-one years ago . . .

'Way back in 1934, The Bristol Company led the way in the field of automation by developing the Bristol Systems of Coordinated Process Control.

These systems automatically controlled and coordinated all of the variables and operations of a process—such as the time of operation of valves, pumps, blowers, dampers, and the control, at a definite value or according to a time program, of variables that affected the uniformity, quality, cost, and yield of a product – such as temperature, pressure, liquid level, flow, pH, humidity, and speed.

RESULTS: They eliminated variations in processing that caused inefficiency – cut down rejections and waste – insured product uniformity – helped cut processing time as much as from 10 days to less than 30 minutes. And these systems quickly paid for themselves.

A REVOLUTIONARY CONCEPT: They brought automatic plant operation to a startling reality and were hailed at the time as a fundamentally new development – which would in time revolutionize manufacturing.

Today, Bristol Coordinated Control Systems are used in the chemical, oil refining, rubber, tobacco, textile, steel, metal working, food, paper, the automotive industries, and many others. They are so completely automatic that it is only necessary to push a button to start up, another to shut down.

The modern solution to processing and manufacturing control problems

Bristol's System of Coordinated Process Control is made possible only by the following unique combination of facilities, which have been developed during 66 years of building and applying thousands of automatic control systems and instruments in practically all industries:

1. The complete line of modern Bristol Automatic, Controlling, Recording, Electronic, and Telemetering Instruments, representing some of the most advanced ideas in instrument engineering.
2. Bristol's Fully-Automatic Time-Cycle Controllers or "Mechanical Brains".
3. Bristol's ability to combine electronics and the mechanical phases of automation.
4. The ability and facilities of Bristol's engineering staff, gained by long experience and Bristol's pioneering work in the field of automation.

Bristol Application Engineering is at your service:

Our application and field engineers are ready to solve control problems involving automation and Coordinated Process Control Systems by working jointly with your research, development, and plant engineers.

Have you an automation problem?

Our application engineers and nation-wide group of field engineers would like an opportunity to work with your technical staff on any problems of automation for which Bristol Controlling and Recording Equipment and Bristol Coordinated Control Systems appear to be the solution. 5.3

BRISTOL PRODUCTS:

Automatic Controlling, Recording, and Telemetering Instruments for:

Pressure, Vacuum, Absolute Pressure, Draft, Differential Pressure, and Barometric Pressure.
Temperature (Thermometers, Potentiometers and Pyrometers).
Flow, Water and Liquid Level, and Specific Gravity.
pH and Conductivity.
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Including:

Automatic Control Systems
Electronic Potentiometers
Graphic Panel Instruments
Time-Cycle Controllers
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Instrument Panels
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Write to The Bristol Company, 115 Bristol Road, Waterbury 20, Conn.

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BRISTOL

POINTS THE WAY IN HUMAN-ENGINEERED INSTRUMENTATION

AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS

For more information, use coupon on last page.

TO THE LOADING DOCK—Vestibule track doors. "Series 50" cold storage door, metal clad for washing down. Steel kick plate for extra protection.

Controlled Cold for Meat Storage Protected by Jamison Doors

Designed for speed and economy of wholesale meat handling, the Massachusetts Wholesale Food Terminal houses many firms under one roof. The doors illustrated are typical of the Jamison doors installed to protect each of the "controlled cold" areas.

Whatever you need in cold storage doors, Jamison can fit them perfectly. Consult your architect or write direct. JAMISON COLD STORAGE DOOR COMPANY, HAGERSTOWN, MD., U.S.A.

FOR BELOW ZERO STORAGE—Jamison Super Freezer Door on the freezer compartment.

FROM 34° STORAGE TO 50° SHIPPING ROOM—Vestibule track door with Jamison Standard Door, metal clad for sanitation.

JAMISON
HAGERSTOWN, MARYLAND, U. S. A.

More JAMISON Doors are used by *more* people than any other Cold Storage Door in the world.

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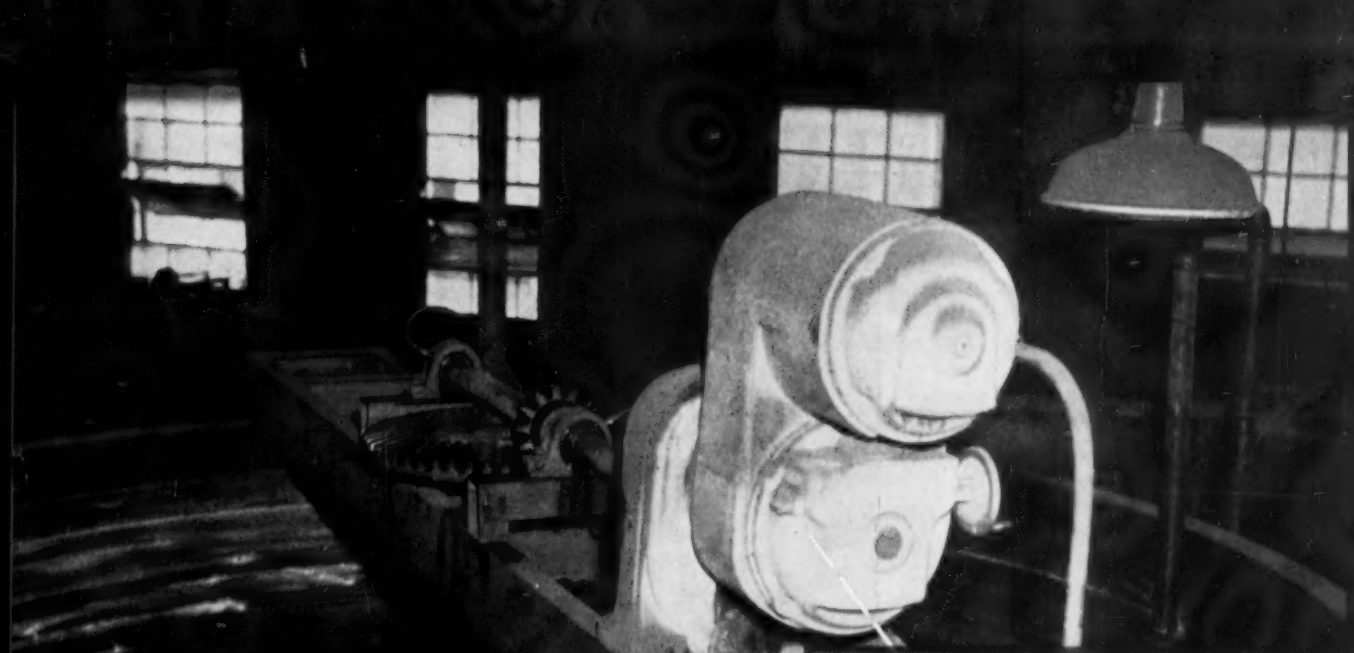

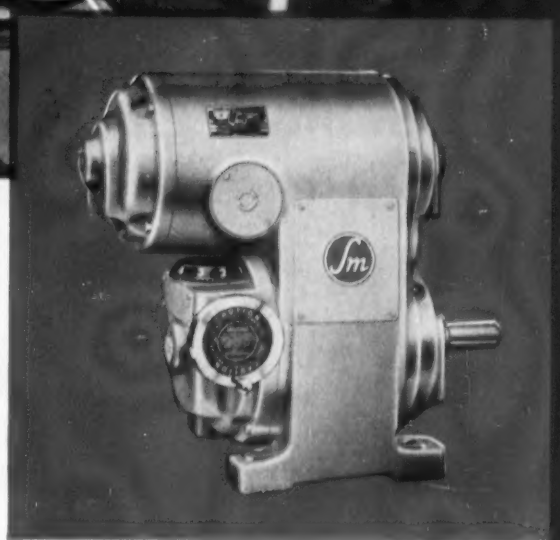

THE HUMKO CO. GETS EXACT SPEED CONTROL ON MIXERS WITH SPEED-TROLS

Mr. J. H. Kirby, Vice-President of The Humko Co., writes: "In processing vegetable oil and shortening we must drive our mixers at various speeds... a Speed-Trol was installed for this purpose... we were so well pleased with its performance that we installed Speed-Trols on *ALL* of our vegetable oil mixers... Speed-Trols give the exact speed regulation needed for vegetable oil processing."

Industry Names Speed-Trol Production Advantages

In a nation-wide user survey of Sterling Speed-Trol Variable Speed Electric Power Drives:

86% Increased Production. **48%** Improved Product Quality. **64%** Reduced Production Costs. **42%** Modernized Equipment and Machines. **20%** Reduced Spoilage and Rejects. **28%** Increased Machine Versatility. **18%** Increased Plant Safety. **34%** Improved Employee Morale. **62%** Lowered Maintenance Costs. **46%** Saved Space. **18%** Simplified Operations. **16%** Synchronized Operations.

Investigate the possibilities of bringing some of these Speed-Trol production advantages to your plant. Sterling Engineering Sales Offices and over 400 Distributors and Service Shops throughout the nation effectively serve every industrial, commercial and agricultural area.

20-PAGE ILLUSTRATED CATALOG ... Sterling Speed-Trol, Slo-Speed, Klosd and Klosd-Tite Electric Power Drives. Write for catalog No. 201.

There is a Sterling Electric Power Drive to Meet Virtually Every Requirement

Sterling Slo-Speed Electric Power Drives—for geared low speed at its best
Sterling Klosd and Klosd-Tite Motors—for constant normal speed at its best

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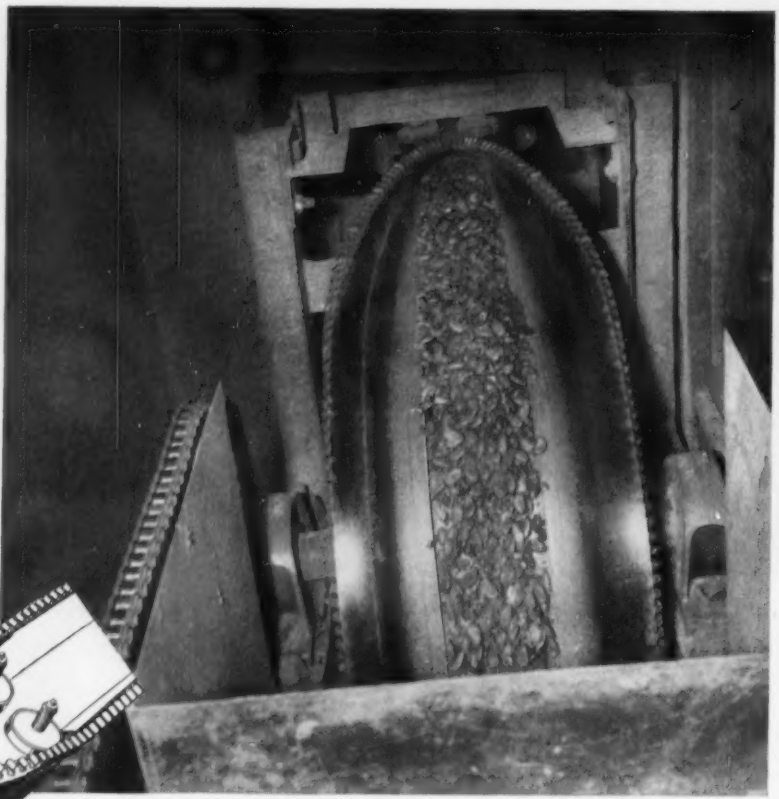
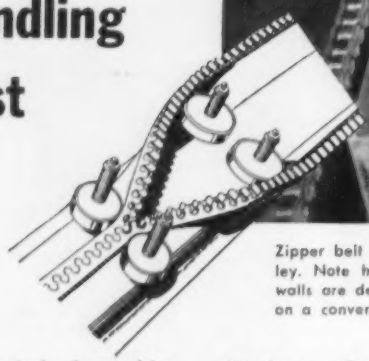
A. N. STOLLWERCK INC. ZIPPER CONVEYOR ELEVATOR FOR HANDLING COCOA BEANS

Diagram of Zipper conveyor-elevator for handling cocoa beans at A. N. Stollwerck, Inc. System lifts beans 30 feet before beginning a 160-foot run over rooftops.

Zipper System Ends Cocoa Bean Breakage, Bag Handling and Dust





Zipper belt discharges over head pulley. Note how rubber teeth on sidewalls are designed to mesh like those on a conventional slide fastener.

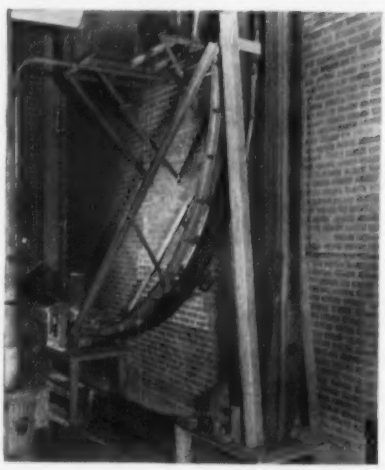
A. N. Stollwerck, Inc. had a 3-way objective when it revamped its handling system. It wanted to eliminate breakage of cocoa beans — do away with manual handling of heavy bags — and get rid of dust. An S-A Zipper System met all three requirements — and required no major changes in plant set-up.

Providing the gentle conveying and elevating action called for, the completely dust-tight system went into operation in late 1950. Dust and lint from both beans and bags has ceased to be a problem. Beans are now moved with little or no breakage.

Beans are moved to the de-stoner and cleaner via a bucket elevator, and gravity discharged to the Zipper conveyor-elevator. Just beyond the loading point the Zipper is zipped shut like a conventional slide fastener. Dust can't escape, nor can dirt get into the system. After being raised and carried 160 feet along the roof-top, the beans are chuted directly to a storage hopper.

The clean, dust-tight Zipper has reduced plant housekeeping time formerly needed to insure product purity. Reduced bean breakage has improved processing and bags no longer must be manually handled. Since the Zipper runs on the rooftop outside the plant valuable floor space is now devoted to productive use.

If advantages like these can help your operation, look into the S-A Zipper. A letter will bring you full facts — or a free survey that may show you some surprising economies over your present handling methods. No obligation, of course.



Return run of Zipper belt. Belt is open and flat, zips shut immediately past feed point.

SINCE 1901 S-A STEPHENS-ADAMSON MFG. CO.

STEPHENS-ADAMSON MFG. CO.

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Engineering Division

Specialists in the design and manufacture of all types of bulk materials conveying systems.

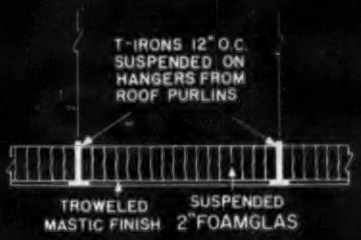
Standard Products Division

A complete line of conveyor accessories including centrifugal loaders—car pullers—bin level controls—etc.

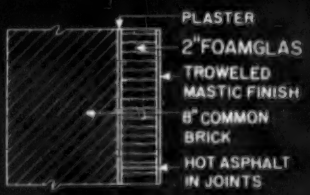
Sealmaster Division

A complete line of industrial ball bearing units available in both standard and special housings.

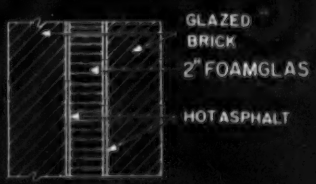
DOUGH ROOMS (90°F - 90% R.H.)
AND COOLERS (35 to 40°F)
TYPICAL SECTIONS



TYPICAL SUSPENDED CEILING SECTION

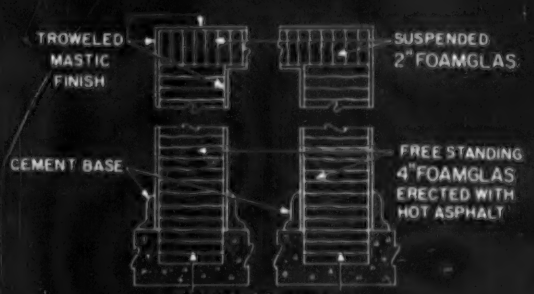


TYPICAL WALL LINING SECTION



TYPICAL COREWALL SECTION

ICING TUNNEL
TYPICAL SECTION


TROWELED MASTIC FINISH
SUSPENDED 2" FOAMGLAS
CEMENT BASE
FREE STANDING 4" FOAMGLAS ERECTED WITH HOT ASPHALT
FOAMGLAS IMBEDDED 2" IN CONCRETE FLOOR

ROOF
TYPICAL SECTION

Architects and Engineers: Skidmore, Owings & Merrill, Chicago
General Contractor: George A. Fuller Co., Chicago
Insulation Contractor: Industrial Products Co., Inc., Chicago
Roofer: Brown & Kerr, Chicago

Only moisture-proof FOAMGLAS can effectively insulate all these for United Biscuit . . .

hot, humid dough rooms . . . coolers . . . icing tunnels . . . roof

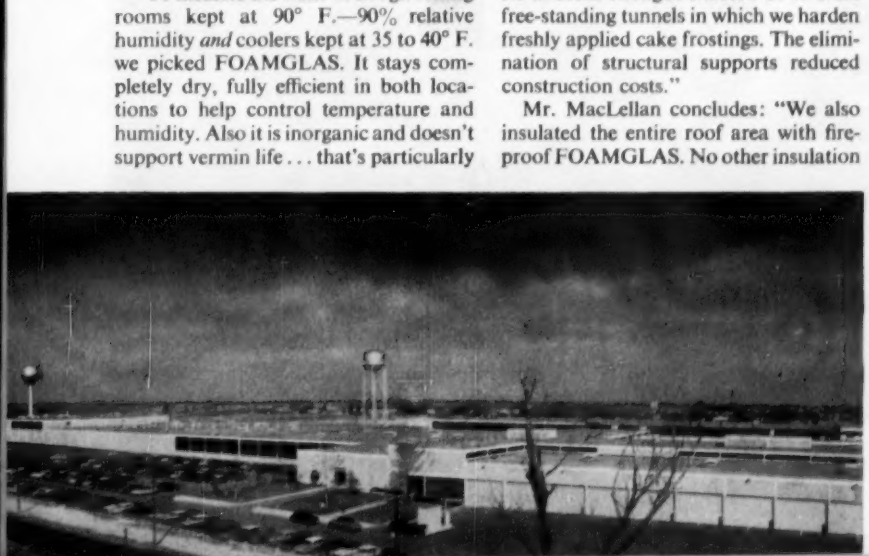
K. F. MacLellan, president of United Biscuit Company, tells how they benefited from the unique properties of FOAMGLAS insulation at their Sawyer Division's big new plant in Melrose Park, Illinois:

"To insulate the walls of dough setting rooms kept at 90° F.—90% relative humidity *and* coolers kept at 35 to 40° F. we picked FOAMGLAS. It stays completely dry, fully efficient in both locations to help control temperature and humidity. Also it is inorganic and doesn't support vermin life . . . that's particularly important, of course, in all food plants.

"The extra rigidity of FOAMGLAS enabled us to suspend it between T-irons to form dropped ceilings. That's cutting our operating costs by reducing the volume of air to be heated or cooled. Its unusual strength enabled us to erect free-standing tunnels in which we harden freshly applied cake frostings. The elimination of structural supports reduced construction costs."

Mr. MacLellan concludes: "We also insulated the entire roof area with fireproof FOAMGLAS. No other insulation could have given us such effective results on such diverse, difficult applications."

Find out today how *you* can save by using FOAMGLAS. Write for your choice of booklets on insulation for buildings, cold storage spaces, piping or equipment.



Pittsburgh Corning Corporation
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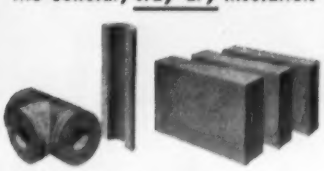
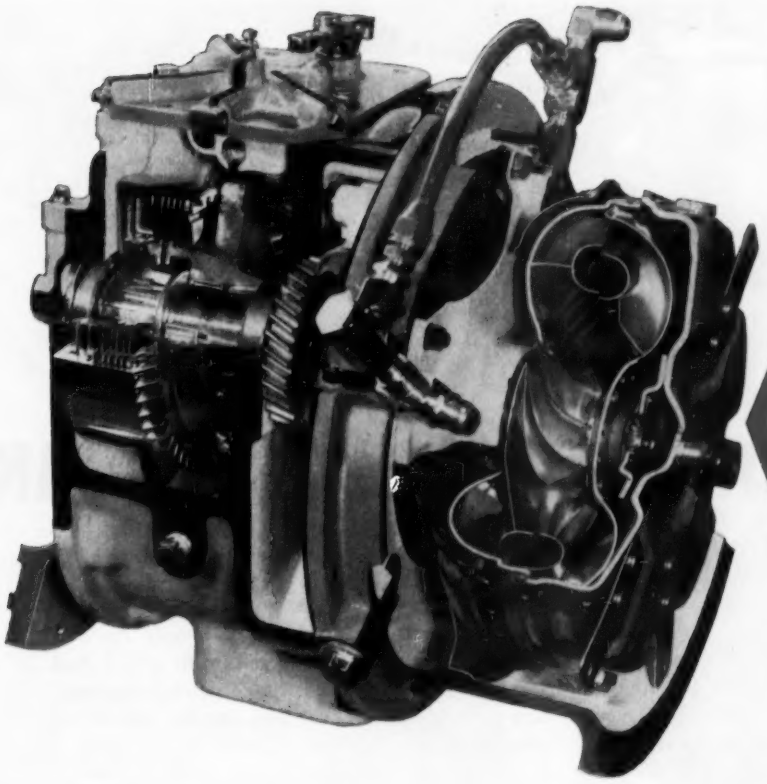
FOAMGLAS®
the cellular, stay-dry insulation



Here's WHY You'll Get MORE WORK With Hydratork

Clark Hydratork Carloader loads Mufflers, 234 at a clip—Maremount Automotive Products, Chicago



CLARK'S NEW HYDRATORK DRIVE

Powerful, compact . . . *designed* to give you more work. Split-housing provides complete accessibility to all operating components. Engineered for the constant stop-and-start operation of a fork truck . . . clutchless Hydratork Drive is the most advanced transmission on the market.

Clark's Hydratork Carloader sets NEW standards for the industry!

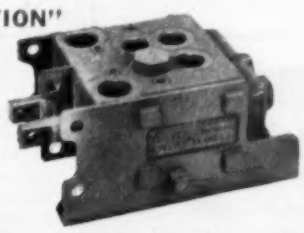
MORE POWERFUL ENGINE
Big, new engine gives you faster acceleration, faster travel speeds, power reserve for extra work loads.

BETTER GRADABILITY
The most efficient operating powertrain on the market today, provides power when you need it to climb the steepest grades.

FASTER LIFTING SPEEDS
Fast, powerful response—lifting speed when loaded has been increased to 37 feet per minute.

PRECISE LOAD CONTROL
New tilt and lift valves give positive load control . . . load jump and load shock are eliminated.

NEW "FEATHER ACTION" VALVE Metering action regulates flow of fluid through lifting valve, giving balanced pressure, eliminating load shock throughout entire hydraulic system, truck and load. Sure, positive lifting action . . . less stoppages . . . more work!



NEW TILT LOCK VALVE
Equalizes pressures on both ends of tilt cylinders, eliminating "load jump" caused by vacuum built up on one end of cylinder. Here is positive holding action . . . additional safety . . . more work!

It's The Most Modern Lift Truck Yet! No clutch—no gears to shift gives you better maneuverability, less driver fatigue—MORE WORK! Power multiplication through torque conversion gives you extra power, smooth acceleration—MORE WORK! No clutch means easier driving, less down-time—MORE WORK! Any way you look at it . . . you'll get more work with Clark's Hydratork Carloader. Ask your local Clark dealer for details.

CLARK EQUIPMENT

Industrial Truck Division
CLARK EQUIPMENT COMPANY
Battle Creek 14, Michigan

For more information, use coupon on last page.

S/K apades in industry

THE CASE OF THE PUNGENT POTS AND THE PROCESS MAN WITH A PLAN

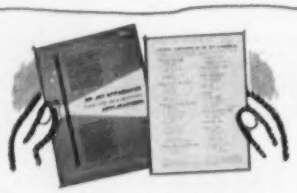
"Gadzooks!" cried Pete the Process Engineer, as he clamped a clothespin on his nose. "I dever sbelled anythig as obdoxious as doze *rendering* keddles."

The kettles kept right on fuming—and so did the employees who had to endure the odor.

"Do somethig," gasped the Plant Manager. "Those nauseatig fubes and odors are perbeating the whole fagtory. Peoble turn up their dozes at working here . . ."

Pete went into his office and held his head. A jet unit would alleviate odors and pacify his disgruntled boss. A jet unit, but what kind? And what about hoods, ductwork, recirculating system? A *jet* unit? Yes! No fan to corrode or wear out . . .

Pete wrote Schutte and Koerting for a copy of new Bulletin J-1 on "Jet Apparatus and Its Industrial Applications." That told him all he needed to know about the varieties, ranges and characteristics of Jet Apparatus.

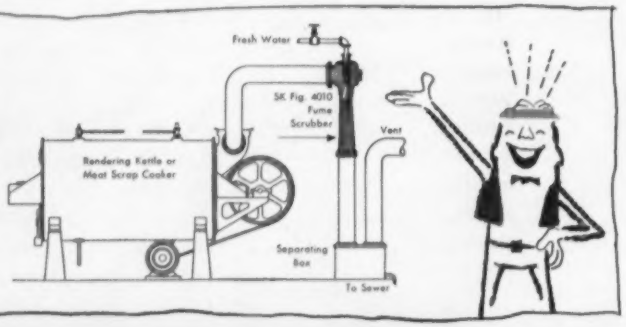


Bulletin J-1 pinpointed the data he needed. He located the desired function, the types of jets suitable for such a function, the type most suitable for his particular requirements.

Then he phoned for a specialist—his nearby SK Sales Engineer, who came a-running. And from him, Pete got a specific recommendation.

LICKED THE PROBLEM IN A JIFFY!

The SK Fig. 4010 Fume Scrubber now removes fumes from the fat melter and discharges clean air to atmosphere. The material being rendered contains a large percentage of moisture, therefore, a large percentage of the fumes is water which must be condensed. The Fume Scrubber has been operating successfully for some time.



MORAL:
Send for a copy of Bulletin J-1 for your files. And make use of a qualified specialist on jet apparatus —your nearest SK Sales Engineer.

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Oil Burning Equipment • Rotameters
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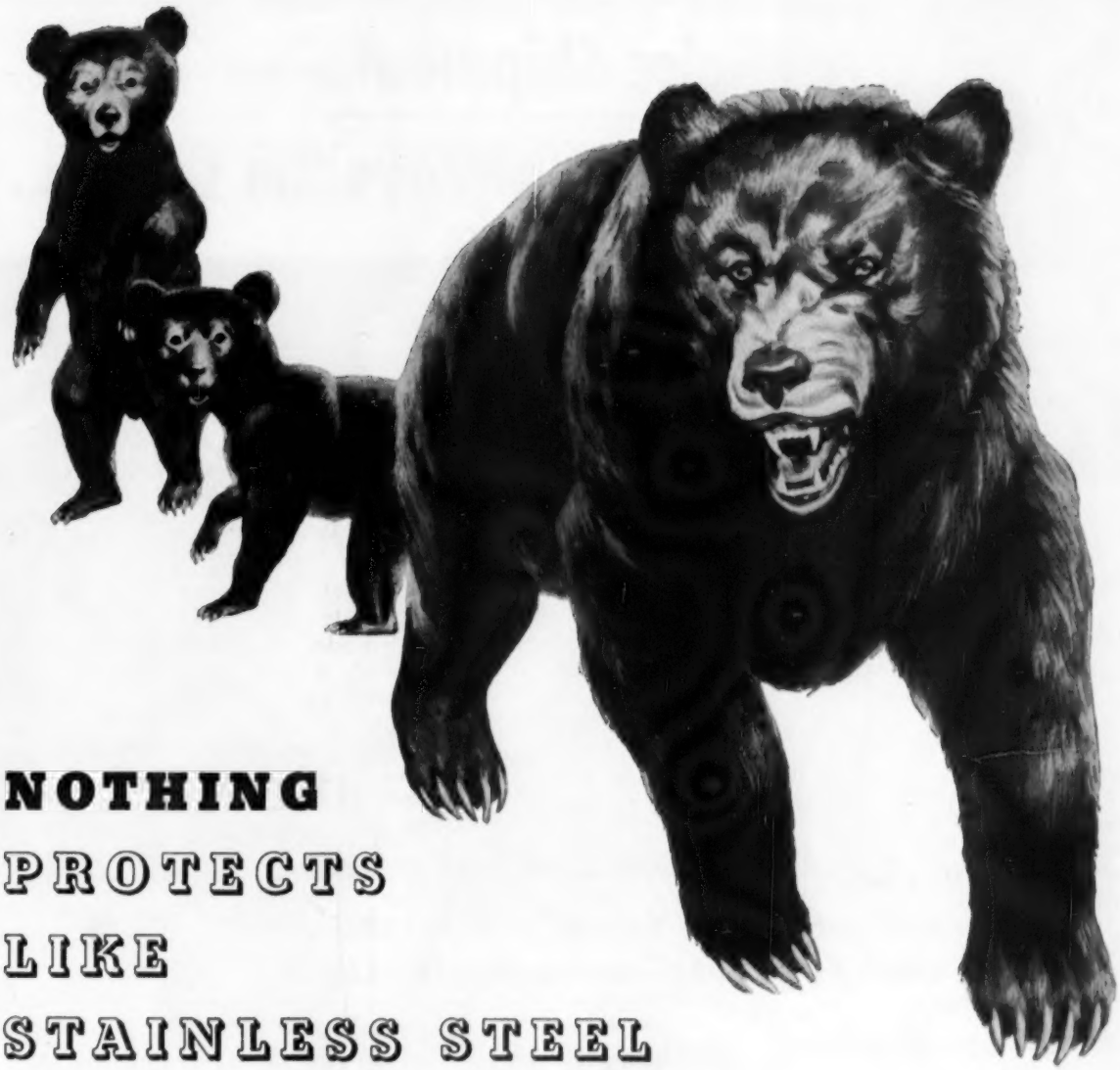
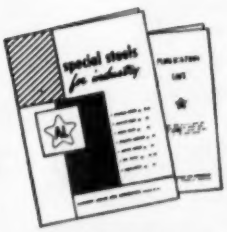


NOTHING PROTECTS LIKE STAINLESS STEEL



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These qualities in AL Stainless Steel can boost the salespower of a product, or cut the operating costs of equipment—often with little or no increase in first cost. Very likely *you* have problems where these advantages can bring you benefits. Let us work with you. ***Allegheny Ludlum Steel Corporation, Oliver Bldg., Pittsburgh 22, Pennsylvania.***

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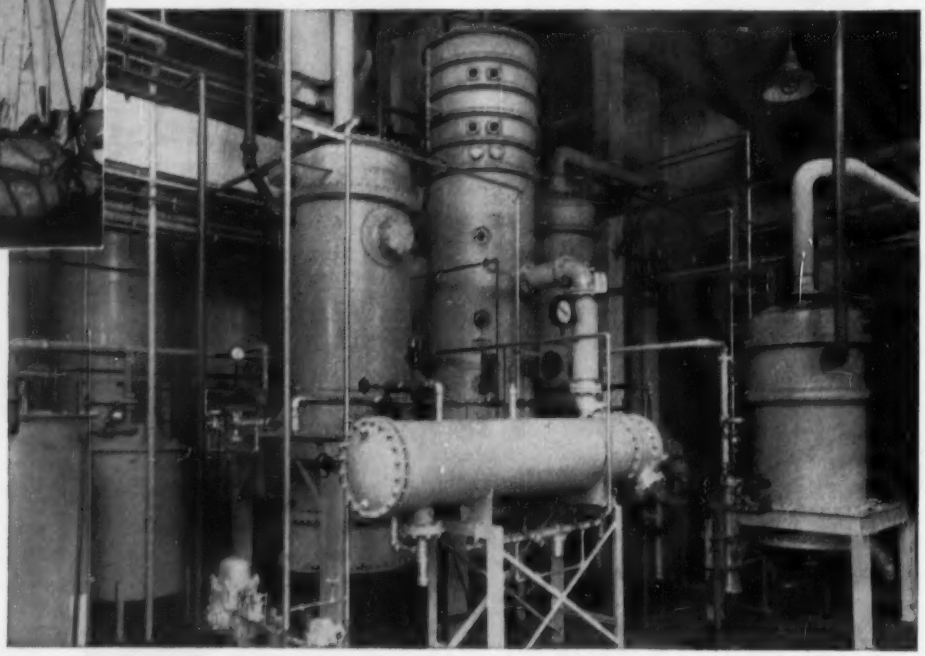
Spice Shipments are not always the same...



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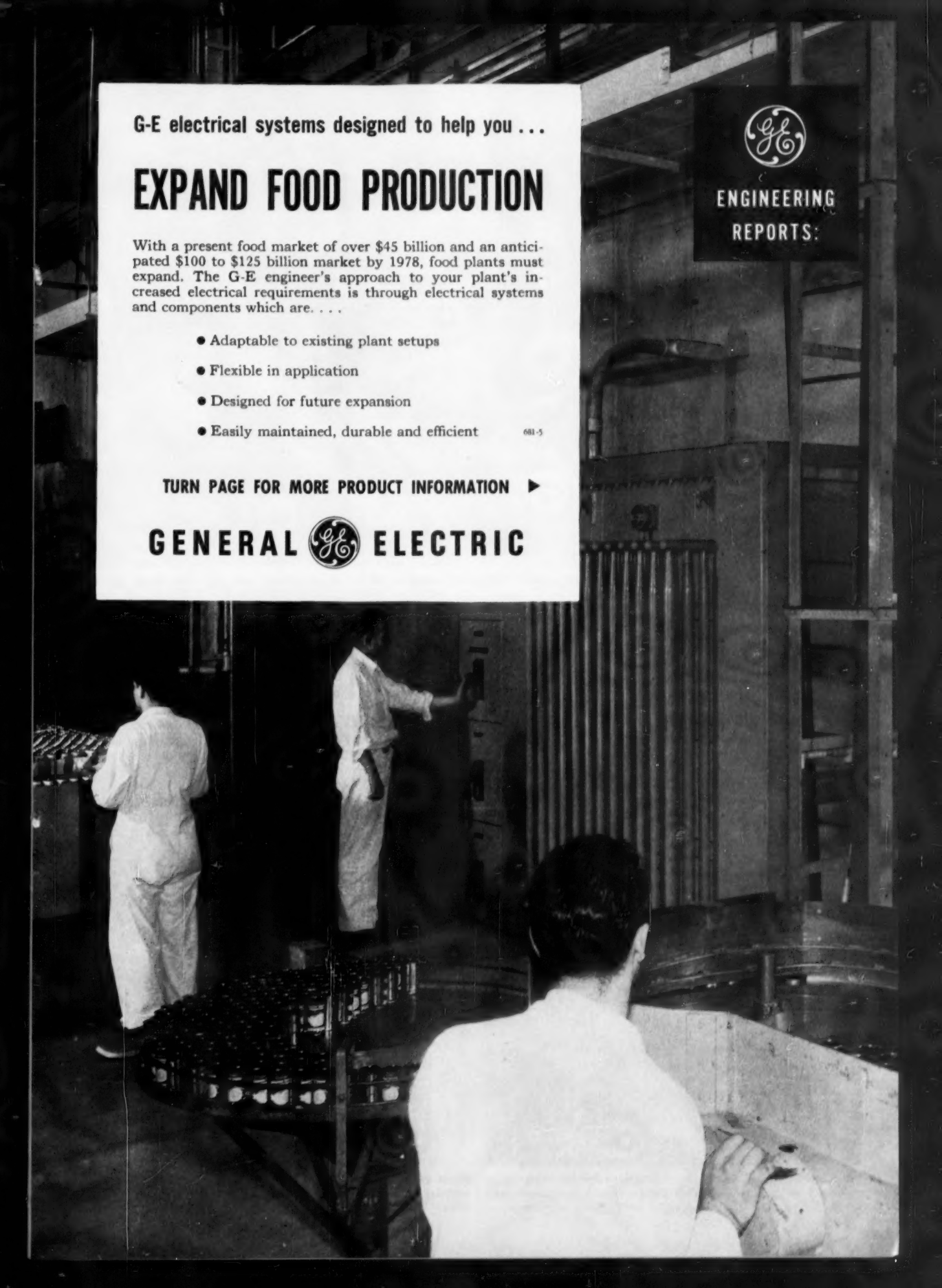
G-E electrical systems designed to help you . . .
EXPAND FOOD PRODUCTION
With a present food market of over $45 billion and an anticipated $100 to $125 billion market by 1978, food plants must expand. The G-E engineer's approach to your plant's increased electrical requirements is through electrical systems and components which are. . . .
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INCREASED OUTPUT AND EFFICIENCY must close the production gap between available manpower and estimated demand. General Electric electrical systems are designed and installed for efficient, flexible, easily expanded production.

G-E ENGINEERING SERVICES (see back page) can help you meet production requirements to bring your electrical system up to date. The result is a modern system integrated into your present plant setup.

FOR ADDITIONAL INFORMATION on how G-E engineered systems and engineering services can help you, contact your G-E Apparatus Sales Representative during your early planning at the nearest G-E Apparatus Sales Office. General Electric Company, Schenectady 5, N. Y.

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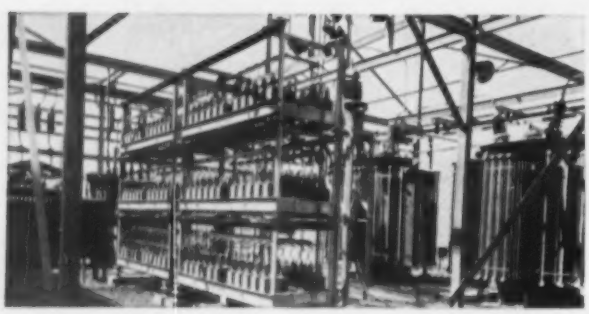
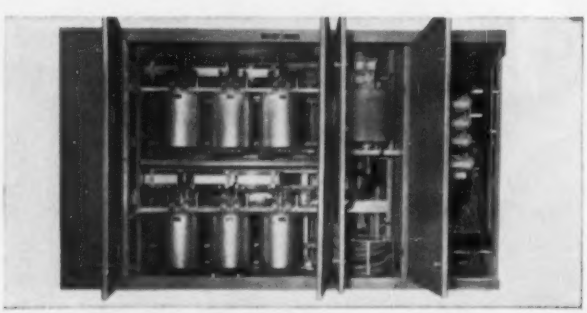
Engineered Electrical Systems for Process Industries

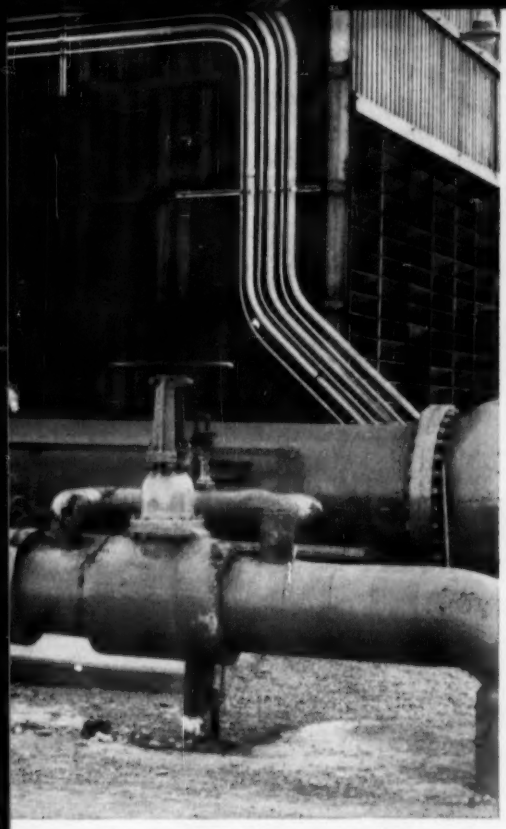
GENERAL ELECTRIC



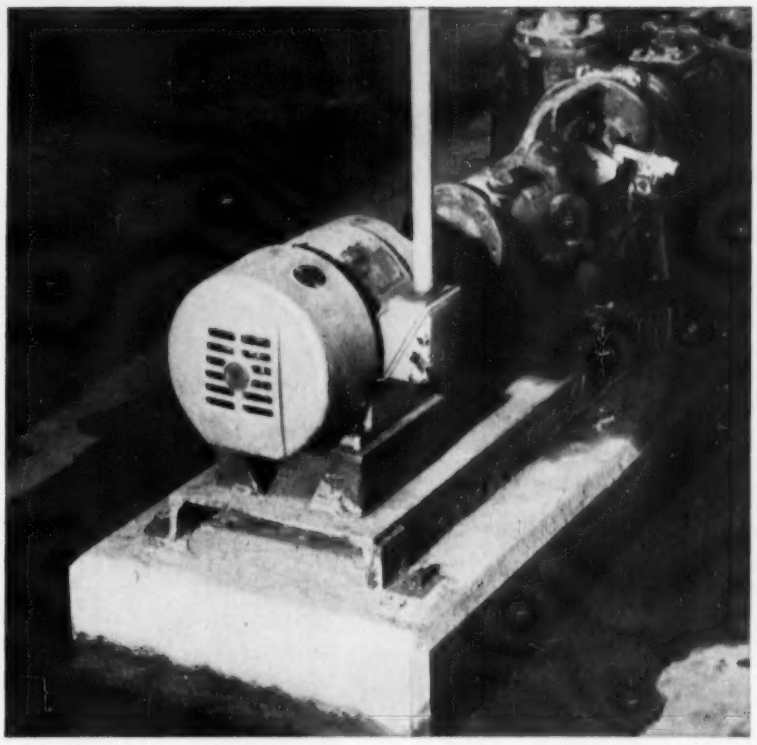
"BUILDING-BLOCK" design of this stack-rack capacitor block reduces installation costs. This design means equipment may easily be expanded or moved to meet plant requirements.



HIGH EFFICIENCY and low installation cost of this pumpless rectifier provide more reliable and economical d-c power. Factory wired, the unit is ready when it arrives to connect and operate.



gives up to 50% longer motor life.

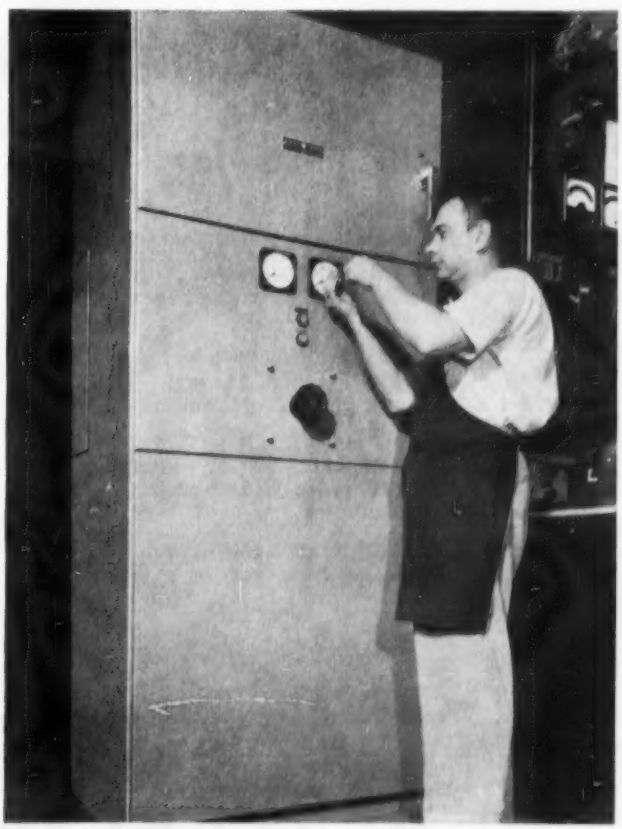


NEW G-E TRI-CLAD* '55' MOTORS, totally enclosed, are suitable for damp areas, even where hosing is necessary. New cooling system cleans while it cools motor.

your process lines

G-E MAGNETIC STARTERS and safety switches are compact, for maximum space savings. Short-circuit protection is provided by circuit breaker or fusible disconnect switch.

CORROSIVE ATMOSPHERE effects are greatly minimized in these G-E Tri-Clad induction motors. Rugged cast-iron construction makes them excellent for process application.



SHORT CIRCUIT PROTECTION up to 60,000 amps, plus 50% greater space savings are provided by all-new G-E Limitamp*.

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SIX G-E ENGINEERING SERVICES . . .

HELP YOU PROTECT YOUR EQUIPMENT INVESTMENT

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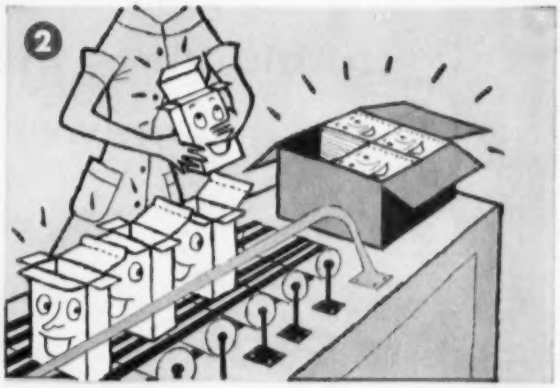
5 **G-E MAINTENANCE SERVICE** from 36 G-E Service Shops will repair and uprate your old equipment, help establish productive maintenance of your equipment, furnish emergency service.

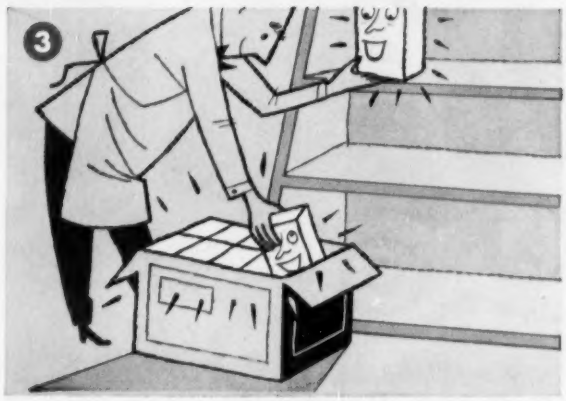
6 **G-E PROJECT CO-ORDINATION** means on-time engineering, shipment, installation of your electric equipment from preliminary diagrams through start-up.

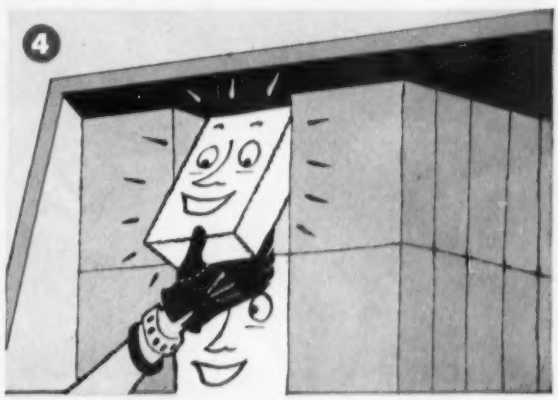
These valuable services are available to you with General Electric equipment. Contact any General Electric Apparatus Sales Office. Meanwhile, for the full story of G-E engineering services, write for brochure GED-2244, General Electric Co., Section 681-5, Schenectady 5, N. Y.

Progress Is Our Most Important Product

GENERAL ELECTRIC







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Here's why:

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Best of all, A-C POLYETHYLENE gives you these advantages with the workability and ease of your regular carton-coating wax. In most cases, you can continue to coat at regular operating temperatures —under same conditions as wax.

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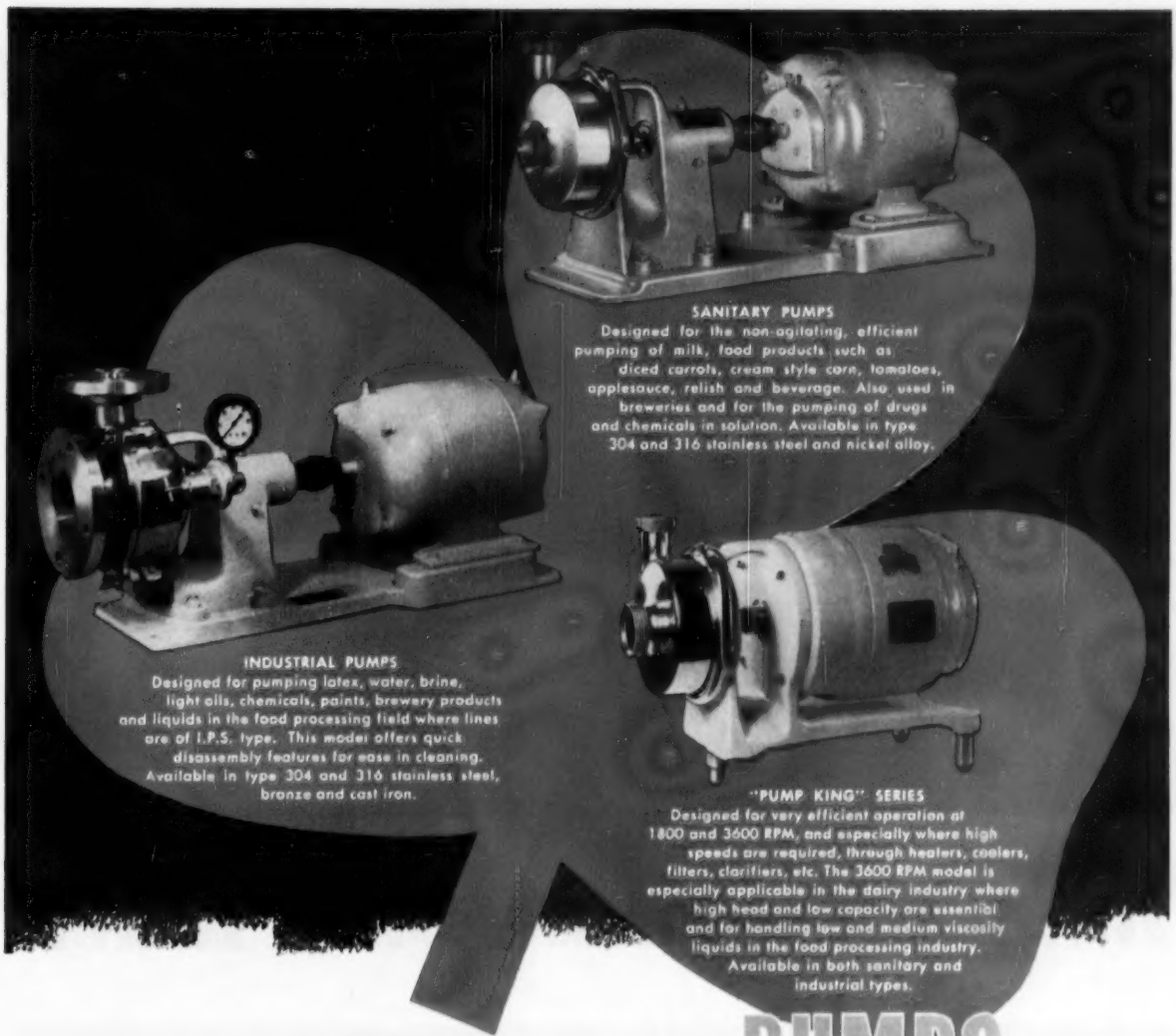

SANITARY PUMPS
Designed for the non-agitating, efficient pumping of milk, food products such as diced carrots, cream style corn, tomatoes, applesauce, relish and beverage. Also used in breweries and for the pumping of drugs and chemicals in solution. Available in type 304 and 316 stainless steel and nickel alloy.

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Designed for pumping latex, water, brine, light oils, chemicals, paints, brewery products and liquids in the food processing field where lines are of I.P.S. type. This model offers quick disassembly features for ease in cleaning. Available in type 304 and 316 stainless steel, bronze and cast iron.

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Designed for very efficient operation at 1800 and 3600 RPM, and especially where high speeds are required, through heaters, coolers, filters, clarifiers, etc. The 3600 RPM model is especially applicable in the dairy industry where high head and low capacity are essential and for handling low and medium viscosity liquids in the food processing industry. Available in both sanitary and industrial types.

These efficient Tri-Clover PUMPS can pump any product that will flow to them . . .

ANY product that will flow to them can be handled efficiently and economically with Tri-Clover non-agitating centrifugal pumps. Illustrated are just three of the many Tri-Clover pump models used extensively in food processing, brewing and bottling, chemical process and general industrial applications. Pumps are available in stainless steel, nickel alloy, bronze and cast iron.

Designed for efficient liquid transmission and low cost maintenance, these pumps have many exclusive features, among which are—patented screw type impellers with quick-acting impeller clips, lightweight heads with a minimum of parts, casing construction permitting fast, easy assembly or disassembly—and a wide choice of seals for various applications, including inert carbon rotary seals for sanitary application, packing gland seals, water cooled seals and seals for latex handling.

Tri-Clover's exclusive developments are the result of many years of specialized engineering experience and thorough knowledge of liquid handling. Let our engineering staff work with you in solving your pumping problems.

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P355

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Why buy an old-fashioned truck and stand to take a licking at trade-in time? See your Chevrolet dealer for the most modern truck money can buy. . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

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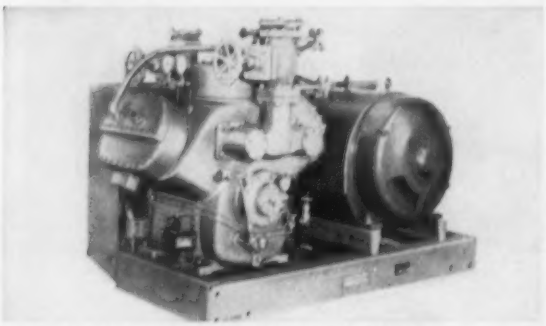
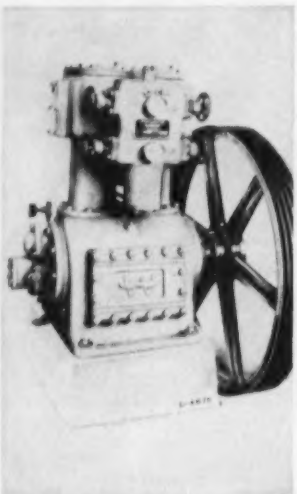
Butcher...Baker...Frozen Food Maker?

Worthington makes the right size of ammonia compressor to refrigerate your product

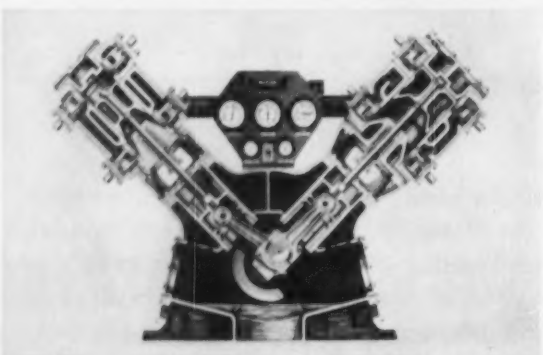
No matter what type of food processing you do . . . how big the capacity of your plant . . . or how limited the floor space, there's a Worthington ammonia compressor to fit your refrigeration needs *exactly*. Worthington Corporation, Air Conditioning and Refrigeration Division, Sect. A.5.63-FE, Harrison, N.J.



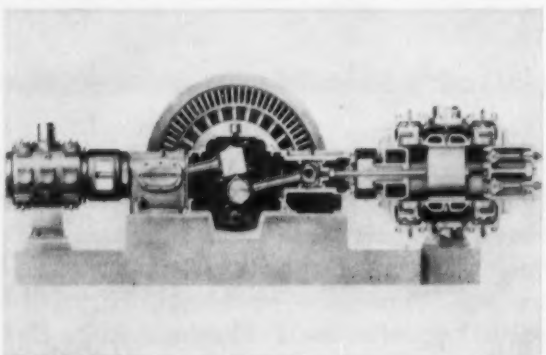
TYPE V-W HIGH-SPEED AMMONIA COMPRESSORS come with 4 and 6 cylinders in capacities from 18 to 150 tons. These lightweight, compact units can be used as high stage or booster machines. Features include famous Feather Valves® for economical operation, self-priming oil pump, balanced lightweight automotive-type pistons, cylinder liners and automatic-unload start and stop capacity control. Efficient, dependable V-W compressors are built for rugged service and long life.



VERTICAL AMMONIA COMPRESSORS (TYPE VSA) are built in capacities from 3 to 150 tons, sizes from 3 in. x 3 in. to 10 in. x 10 in. Features include patented Feather Valves on suction and discharge — lightest, tightest ever made; water jacketed cylinders, forged steel crankshafts and connecting rods; full force-feed lubrication (5 in. x 5 in. and larger).



"Y" AMMONIA COMPRESSORS are constructed for heavy duty and long, uninterrupted service. Large capacity sizes (from 60 to 460 tons) require minimum floor space — an important feature where processing machinery is concerned. For most applications, a flanged mounted motor can be used, eliminating separate motor foundation. "Y" compressors available for single or two-stage operation.



BDC COMPRESSORS are the newest addition to the line. True balanced-opposed design permits smaller, more compact foundations. Cylinders — up to four pairs — are located on opposite sides of a rugged, stable frame and powered by a double-throw crankshaft. Design is ideally suited to large multi-service or multi-stage compression requirements. Ratings from 300 to 10,000 hp. A 5.63

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Three blade mutator shaft for Vogt Continuous Freezer.

▲ Vogt Continuous Freezers at Country Club Ice Cream Co., Paterson, N. J.

How stainless meets design requirements for intricate freezer parts

Resistance to the corrosive attack of strong cleaning solutions . . . and freedom from product contamination are but part of the reason why the scraper blades in these Vogt Freezers are made of stainless steel. Besides this requirement, the blades must be of the right hardness to take and hold a keen edge.

In their search for a material possessing both of these properties, the Cherry-Burrell Corporation, manufacturers of these continuous ice cream freezers, tried Crucible stainless steel, type 410. This straight-chromium grade has proved to be the most satisfactory material for this use. For 410 type stainless not only fights corrosion satisfactorily, but never harms the flavor or quality of the delicate dairy products it touches. And its high hardness and toughness mean that the scraper blades hold a sharp edge longer and require less frequent sharpening.

The rest of the freezer is made of stainless steel, too — because stainless is so easy to clean . . . and its attractive, bright finish makes a good impression on plant visitors.

Whether your product is ice cream, frozen fruit juice, meat, or *any* food — there's a grade of Crucible stainless steel that's just right for your equipment. Ask your Crucible representative for full details. And, if you'd like to have complimentary copies of the handbooks on the uses of stainless in your specific field, find the ones you want in the *Crucible Publication Catalog*. To get it, just write *Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

CRUCIBLE first name in special purpose steels

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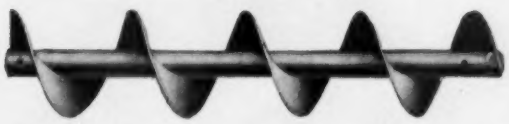
Make sure the screw conveyors you buy pass this quality test!

If they don't . . . investigate LINK-BELT's sound engineering and quality manufacture . . . your assurance of top performance

1. Is flighting accurately formed?

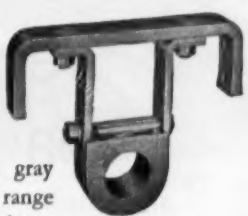


Link-Belt's specialized machinery assures accurate forming, producing uniformity of flighting curvature.

2. Are diameters uniform?

Only specially selected steels are used to meet Link-Belt's rigid specifications.

3. Will the hangers match your exact needs?

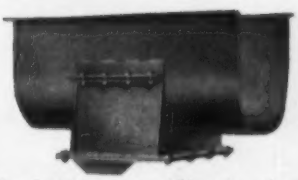


Hangers are available in gray iron or steel frames in a range of styles and with various bearing materials.

4. Will installation be easy?

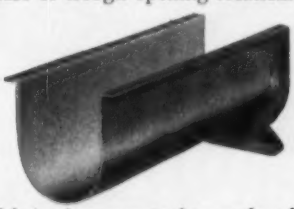
Straightness is checked before shipping, and extra care is taken in handling and loading. Jig-drilled coupling bolt holes facilitate assembly.

5. Can gates be installed on the job?



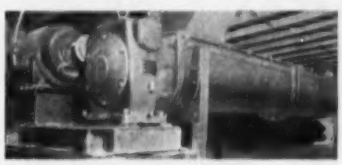
Gates are available for bolting or welding in place right on the job for ease of trough opening location.

6. Are troughs fabricated to your specifications?



Link-Belt's accurate fabrication assures better fit of all components. Choice of metals to fit your need.

7. Is the drive fully integrated?



Only Link-Belt builds a complete line of gear and chain drives, couplings, bearings, shafting.

8. How wide a choice of spouts and gates do you have?

Discharge spouts and gates can be fixed or detachable. Hand or rack-and-pinion, flat or curved slide gates.

LINK-BELT

13,920 **SCREW CONVEYORS**

9. Is full ordering information readily available?

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Zest Locks Flavor in Heat 'n Serve Dinners!

Zest holds fresh, tasty goodness in new, popular mealtime treats . . . never lets a flavor fade!

Delightful, deep-sea fresh fish sticks . . . naturally tasty, convenient frozen dinners . . . these are fast moving, profitable items high on grocery lists today. Competition is keen in these new fields, and you need wholesome, naturally fresh flavor to build lasting brand loyalty. Staley's Zest MSG is famous for building better flavor in frozen foods. Zest *never lets a flavor fade* . . . protects freshness and taste from damage during processing, brings out flavor perfection all the way to the dinner table, prevents "steam table fatigue." Zest is easy to use, too . . . you just add it like salt. Start boosting profits now with Staley's MSG. See your Staley representative or write today for more information.

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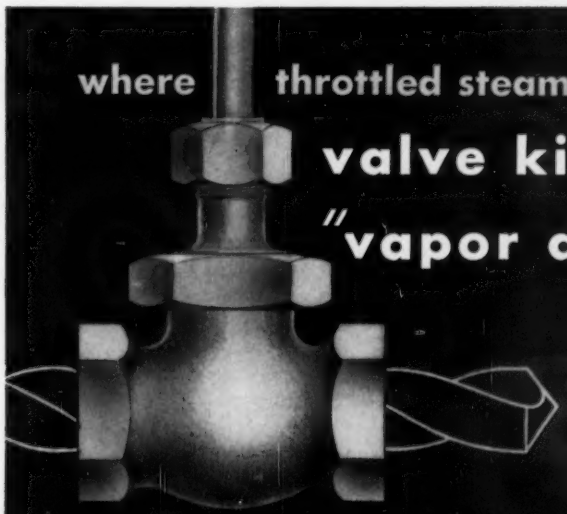
where throttled steam is a valve killing "vapor drill"



JENKINS PLUG TYPE VALVES
with the
500 BRINELL
STAINLESS STEEL
ARMOR SEAT
will lower costs

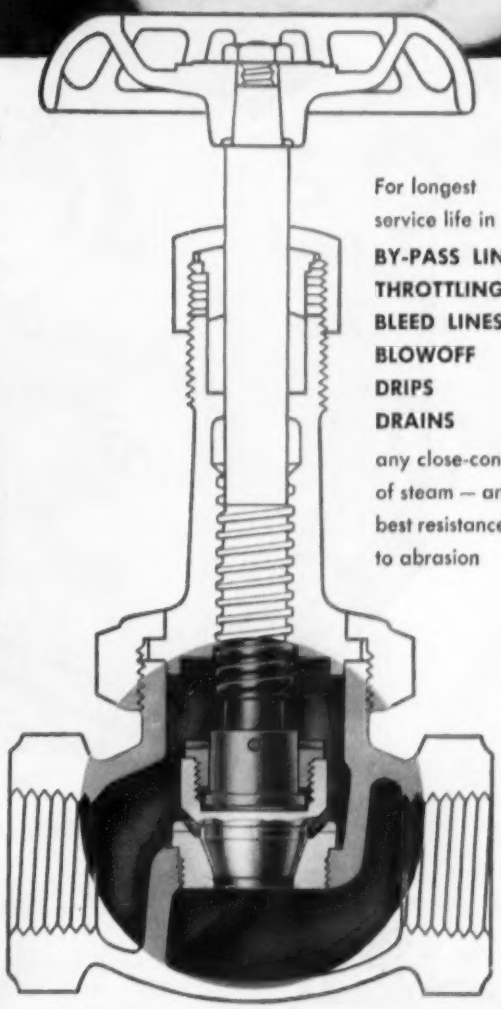
Closely regulated steam erodes grooves in seating units and drastically cuts service life of ordinary valves.

Jenkins Plug Type Valves have been engineered in every detail for maximum wear in such valve-killing service. The stainless steel Armor Seat defies the "vapor drill", and Jenkins quality throughout gives them top rating for wear-proof and trouble-proof perfomance.

Make you own test . . . in your toughest steam service . . . or anywhere that abrasion or erosion causes frequent valve failure. Compare, part for part, with any similar valve. You'll find that, again, Jenkins *extra value* pays off in longer life and lower maintenance cost.

Plug and seat ring are Jenkins JX500, a Stainless chromium alloy steel made to Jenkins high strength specifications, heat-treated to 500 Brinell. Seating surfaces are super-hard and mirror-smooth, offer highest resistance to galling, cutting, abrasion, and erosion. Wide, steep, 30° total taper permits extremely close regulation of flow and vapor-tight closure.

The Stainless steel plug is securely fastened to the spindle with a bronze locknut. Spindle is aluminum bronze with a tensile strength exceeding 70,000 lbs., — has high corrosion resistance.



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any close-control of steam — and for best resistance to abrasion

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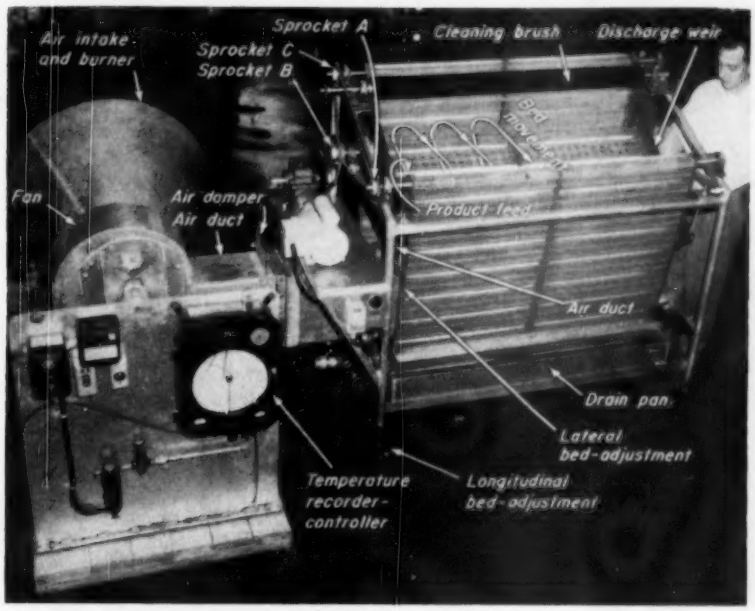
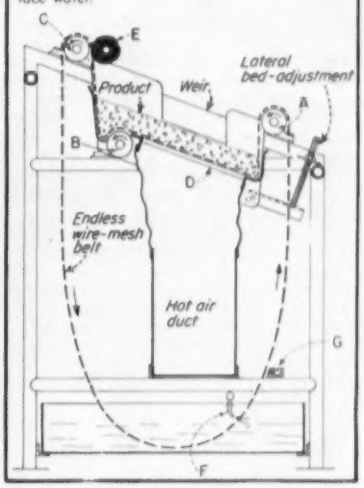


HEATED BY DIRECT COMBUSTION, drying air is delivered by the fan (left). The airstream goes via ductwork up and through the bed of material traveling on the endless wire-mesh belt-trough, which . . .

PRODUCT TRAVELS in spiral movements on endless belt. Supported and carried by roller-chain sprockets on drive shafts (A), (B), and (C), belt rides on air grate (D), forming trough. Brush (E) and hot water sprays (F) continuously clean it. Compressed air (G) removes belt surface water.



. . . **MAKES MATERIAL** move both laterally and longitudinally in a fold-over spiral fashion.

BELT-TROUGH

A New Continuous Dehydrator

Designed for partial drying of food pieces for dehydrofreezing, this unit opens new fields through its . . .

★ **Throughput action** ★ **Non-stop flow**
★ **Better use of heated air** ★ **Improved drying control**
★ **Raising of product quality**

E. LOWE, W. D. RAMAGE, E. L. DURKEE and W. E. HAMILTON
Agricultural Research Service, Western Utilization Research Branch, USDA, Albany, Calif.

When the dehydrofreezing process was first developed during World War II, the partial drying step was carried out in conventional equipment —such as cabinet and tunnel driers.

But it was soon apparent that the drying operation is the most critical part of the process and that it is not too satisfactory in conventional equipment because of the non-uniformity of the drying from point to point in these units.

Recent years, however, have witnessed considerable progress in the development of new types of drying equipment.

Latest stride in this direction is the Belt-Trough Drier—which gets its name from the shape assumed by the moving belt while in contact with the product.

This drier consists essentially of an endless wire-mesh conveyor belt supported and transported by roller-chain sprockets. These shafts drive these sprockets at the same speed. The conveyor belt, between the shafts, thus forms a trough, the bottom of which rests on top of an inclined, flat-surfaced air grate.

Down to Details

Drying air is heated by direct combustion of gas at the intake of the single width, single inlet fan and delivered via ductwork, past the air grate and up through the trough. Total air flow is adjusted by means of a guillotine damper located at the fan discharge.

Fresh material is fed onto the

Spotlight on Factors

Development work has been in progress, in the past several years, on a new type of process—the partial drying of fruit or vegetable pieces as a step preceding freezing, canning, or other subsequent processing.

Advantages gained by such preliminary partial dehydration has been clearly described in a public service patent.* Further, a number of technical publications relate results of development work on particular commodities.

Here, the basic benefits stem from reduction by nearly one-half of the weight and volume of the material processed (compared to conventional methods) without loss of product quality.

Quality of a dehydrofrozen product depends largely upon the drying operation, since over-drying changes the rehydration characteristics of the resulting product. For example, apple slices dehydrated beyond about 50% weight reduction become progressively more collapsed and wrinkled, and difficult if not impossible to rehydrate fully.**

Uniformity of the drying within a piece, as well as for different pieces, is therefore essential for attaining a dehydrofrozen product of consistently high quality.

Need for drying equipment capable of partially drying apple slices to a uniform moisture level resulted in the development of the through-flow rotary drier. This unit was used successfully in a semi-commercial dehydrofreezing operation at an apple processing plant.***

Then subsequently it has been used to partially dry other commodities for dehydrofreezing. In a semi-commercial operation it performed successfully in the production of approximately 11,000 lb. of dehydrofrozen peas.

Also, in smaller scale operations it was used experimentally to dry celery and green bell peppers. Diced ⅜ in. maximum dimension, these were dried to 67% weight reduction without difficulty.

The inability, however, of the through-flow rotary drier to handle fruits and vegetables of high sugar content—because of their tendency to adhere to the surface of the drier—then stimulated the thinking on new designs not subject to this difficulty.

Described in the accompanying article is the most recent development in this category—the belt-trough drier, a new and unique type of dehydrator with several potentially outstanding characteristics.

The novel method employed in the new belt-trough drier to insure uniform exposure of the material to the airstream (or other gases or vapors) may well find use in other food-processing operations.

Here, there may be cited freezing, blanching and cooking, and finish drying.—*The Authors*

* Howard, L. B., Ramage, W. D., and Rasmussen, C. L. Process for preserving foods. U. S. Patent No. 2,477,605 (Aug. 7, 1949).

** Talburt, W. F., Walker, L. H., and Powers, M. J. "Dehydrofrozen Apples." *Food Technology*, 1950, Vol. IV, No. 12, pages 496-498.

*** Rockwell, W. C., Lowe, E., Smith, G. S., and Powers, M. J. "New Through-flow Rotary Drier for the Partial Drying of Apple Slices," *Food Technology*, 1954, Vol. VIII, No. 11, pages 500-502.

trough at the feed end of the drier and, in a series of spiral-like movements, moves up the incline and toward the adjustable discharge weir at the opposite end. Product bed depth is determined by the height of the weir.

The flights, attached to the belt surface, are essential for proper bed movement of very difficult materials, such as starched, quarter-diced carrots. Though not essential for other products, these flights may also be used for full diced carrots, celery, and pimentos.

Non-Stop Cleaning

There is continuous cleaning of the belt by a rotating brush and hot water sprays. A compressed air nozzle helps to remove some of the water from its surface before it re-enters the drying section.

The drier trough is inclined or tilted both laterally and longitudinally. Amount of tilt is adjustable in both directions to produce a uniform bed depth over the entire bed area. Adjustments are made to suit the natural angle assumed by the material being dried at the belt speed used.

Uniform bed depth results in good heat usage. Air leaves the top of the bed nearly saturated over the entire bed area. Wet-bulb depression of exhaust air above the experimental drier is usually maintained at about 2 to 5 deg. F. Control of the wet-bulb depression is by adjusting the guillotine damper to balance the air flow with the feed rate.

Maximum effective bed depth, for a belt-trough drier with ample air heating and circulating capacities, is generally limited by the size, shape, and density of the material being dried. Deeper beds require correspondingly greater rates of air flow and hence higher air velocities in the drier.

Movement of air up through the bed causes some fluidization of the material being dried, and at higher air velocities some of the smaller pieces become air-borne and are blown out of the drier.

Reason that size, shape, and density of product pieces limits effective bed depth lies in the fact that these three physical characteristics determine the velocity at which the material becomes air-borne. Maximum bed depth for most diced vegetables, such as carrots, celery, and pimentos, is approximately 2½ to 3½ in.

The retention, or residence time, in the drier is a function of the bed depth and rate of feed. Maximum drier capacity is attained by regulating the rate of feed so the bed depth is the maximum permissible without causing the product pieces to become air-borne.

Drying is very uniform due to the spiral-shaped path of the product as it moves continuously toward the discharge weir.

This action follows a path that brings the material in the bottom layers of the bed, adjacent to the moving belt, up the incline. On reaching the top, the upper layers of the bed material cascade and tumble by gravity back down to the bottom of the trough. A belt speed of 10 fpm. moves material up the incline and back down again in 1½ min.

The continuous agitation prevents growth of blowholes in the bed. For just as quickly as they are formed, the blowholes are covered over by material in the rapidly moving bed.

Unusually high drying air temperatures are possible because the continuous mixing prevents pieces from staying in a high temperature zone long enough to be damaged. Carrots, celery, and pimentos, diced to ⅜ in. are dried to 65% weight reduction at 300 deg. F. dry bulb and 110 deg. F. wet-bulb air inlet temperatures in about 20 min.

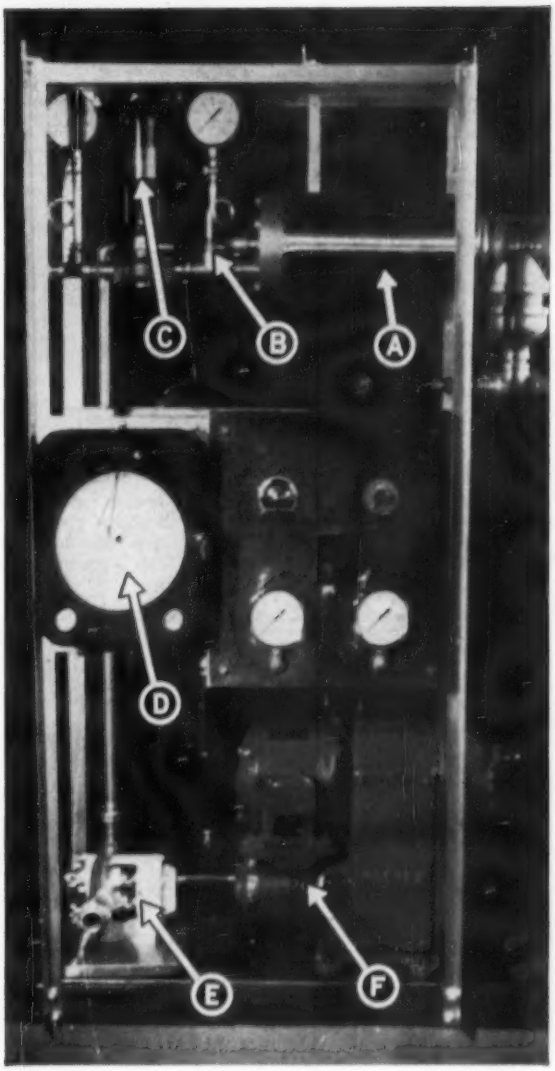
The capacity of the experimental drier under these conditions is approximately 275 lb. of fresh material per hour. Since the trough is 22 in. wide by 52 in. long, this corresponds to an evaporative capacity of 22.5 lb. of water per hour per square foot of trough surface.

Air movement under these conditions is approximately 3,200 cu. ft. per minute against a static pressure of 0.8 in. w.g. measured at 300 deg. F. dry bulb and 110 deg. F. wet-bulb.

New Unit Projected

The promising results obtained with this experimental unit have now led to work on the design of a small semi-commercial-size belt-trough drier.

Tentatively, this new drier will have a trough measuring 4 ft. wide by 10 ft. long, and its new features will include (1) better means for removing wash water from the belt surface so as to improve the overall thermal efficiency, (2) built-in all-metal flights on the belt for better sanitation, and (3) better air distribution along the length of the drier to suit the different commodities that will be processed in the equipment.



CLOSEUP OF COMPACT UNIT shows (A) cooker, (B) discharge with thermocouple, (C) pressure regulator, (D) temperature controller-recorder, (E) pump, and (F) variable speed drive.

Little That Does a *Lot*

It's only a 4-in.-dia. steam-pressure pipe. But it can convert starch-syrup slurry into gum jellies and deliver them to the flavoring kettle within a mere 5 sec. at a rate of 1,500 to 7,000 lb. per hr.! . . . Other uses seen for cook-gelatinizing starch

Continuous Steam-Jet Cooker Pays Off in 16 Ways

FE STAFF

Three features are outstanding in the continuous starch jelly cooking process developed at Farley Mfg. Co., Skokie, Ill.

1. *Simplicity of construction of the cooker. It doesn't have any moving parts—merely consists of a 4-in. pipe (about 1 ft. long), with a high-pressure steam pipe feeding four jets. Hence, mechanical maintenance is minimized.*

2. *It's not necessary to boil off large quantities of water. Moisture content of the starch-syrup slurry going into the cooker (an enclosed unit) is substantially the same as that coming out.*

3. *It is extremely flexible and easy to operate. Cooker output can be instantly and automatically varied from 1,500 to 7,000 lb. per hr., regardless of temperature of incoming slurry that is converted, in a matter of seconds, into the finished product.*

And continuing on from these 3 dominant aspects of the confectioner's process, we count fully 16 benefits—

4. Cost of equipment is low, involving minimum depreciation.

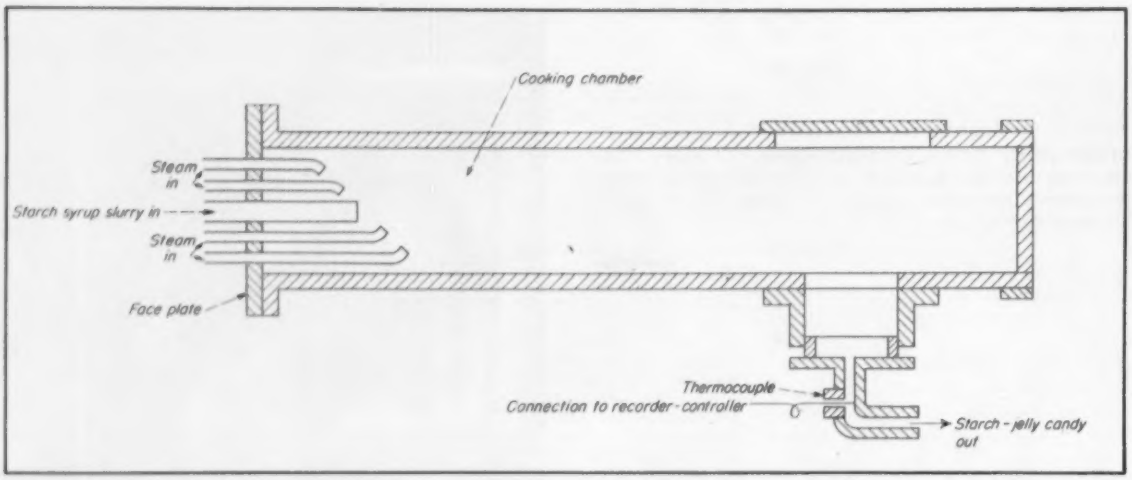
5. Installation—only a few hours.

6. Unit requires only 1½x3 ft. of floor space; cooker can be ceiling-suspended, with remote controls rigged up on the wall or panel.

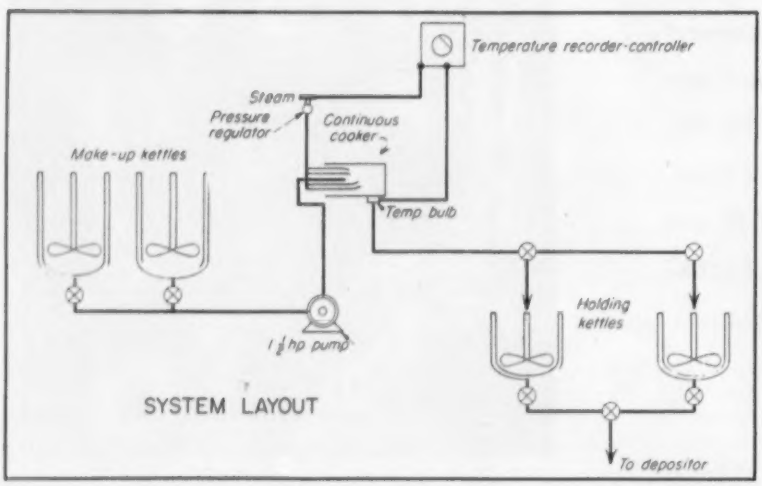
7. Steam consumption is only about 15% of that of the batch method, because of direct heat transfer.

8. Water cooling of the cooked confection is abolished.

9. Foaming and formation of air bubbles are eliminated.



HIGHLY EFFICIENT new method of continuously cooking starch-jelly candies at Farley Mfg. Co. plant is shown step-by-step in this diagram. Starch-syrup slurry is alternately prepared in make-up kettles and pumped into continuous cooker—a 4-in.-dia. pipe with four high-pressure steam jets. Flash-cooked candies are then fed into holding kettles, where color and flavor are introduced before product is discharged to depositor.



HOW SIMPLE COOKER WORKS is revealed here. Starch-syrup slurry (preheated) is fed to pressure-cooking chamber at 1,500-7,000-lb. per hr., along with steam at 25-80 psi. pressure, and heated to 278 F.

10. Cooking can be instantly started or stopped without chance of over- or under-cooking.

11. Equipment can be quickly and easily cleaned by blowing live steam through cooker and supply lines.

12. Sanitation is improved, since the cooker is totally enclosed.

13. Also, the splashing-and-foaming hazard to workers is eliminated.

14. Sugar inversion is minimized due to flash heating.

15. Fresh jelly-gum scrap can be used without pre-melting.

16. Improved starch gelatinization results in clearer starch gum drops.

It may further be noted here that push-button controls can be mounted at the Mogul operator's station.

Key to this non-stop method of cooking starch-gum jellies is the direct transfer of live steam heat in large quantities to starch-syrup slurry—without a barrier between the heat source and the product being heated. And cooking is speeded by heating product at a pressure between 25 and 80 psi.

How It Operates

Ingredients—water and corn syrup—are metered into one of two 1,500-lb.-capacity steam-jacketed, agitator-type make-up kettles, along with corn starch and scrap. Ratio of starch to water is 4½ to 7½ lb. of starch per gallon of water.

Then heat (150-180 F.) and agitation are applied to the starch-sugar-water syrup slurry to rapidly disperse the ingredients.

As the batch is moved (by 1½ hp. positive displacement pump) from one make-up kettle through a 1¼-in. pipe into the continuous cooker, another pre-mix batch is prepared in the second kettle.

Working this way, feeding of the slurry to the cooker is carried out continuously.

Steam is fed (at 25 to 60 psi. pressure) into the 4x12-in. cooker through four ¼-in. jets terminating 2, 4, 6, and 8 in. from the cooker's in-feed. Ends of jets are tipped about 15 deg. to provide a swishing action within the cooking chamber. Slurry is cooked to 278 deg. F.

Steam and cooked confection are discharged through a 1-in. pipe to two 750-lb.-capacity holding kettles. Here, cooling takes place as color and flavor are mixed into the candy. The candy is then gravity-fed to the hopper of the starch-casting machine.

Slurry is cooked and delivered ready for casting in starch molds to the depositing machine in about 5 sec. In contrast, kettle-cooking of a 1,500-lb. batch takes 40 to 60 min.

Automatic Control

A temperature-sensitive bulb at cooker's discharge pipe is hooked to an automatic pneumatically-operated temperature recorder-controller that is preset at 278 deg. F.

And a pressure regulator on the steam line is controlled, through preset units in the instrument, to open and close, through a low-pressure air valve (about 17 psi.), the main steam supply valve.

In this manner, temperature of the incoming slurry is automatically adjusted, and the candy is cooked to a precise temperature.

New Engineering Steers Way to New Product

How coast processor produced combination salmon-macaroni-peas specialty by attuning the methods, equipment—and thinking

WALDON HASTINGS
Production Manager, Marine Foods Packing Co., Seattle, Wash.

A company that "debuts" a new food item finds that a lot more than just the product must be new.

Generally, special equipment and methods are also required—as our organization, Marine Foods Packing Co., of Seattle, readily recognized when it launched its new Honey Boy Dinner, a 15-oz. canned combination of salmon, macaroni, and peas.

To mechanize the process, we required these developments:

- **A mechanical fish-fillet cuber, to cut the fish—without flaking it and with minimum shredding—at the rate of 500 lb./hr.**
- **Devices to measure frozen peas and precooked macaroni.**
- **Meters for MSG solution and vegetable oil.**
- **Modified retort baskets with 350% more capacity than the retort trays from which they were converted.**

And further these new methods had to be devised:

- **Means of thawing and washing frozen fish.**
- **A time-saving, economical manual method of assembling cases.**

Frozen salmon, purchased "heads off, dressed," are removed from freezer storage on the night before processing begins.

These fish are put in trays on 45-lb. parchment paper that has 16 perforations to the sheet. Next, the trays, each containing about 100 lb. of fish, are stacked seven-high on a retort dolly, which is then wheeled on a track into a 10-car double-end retort.

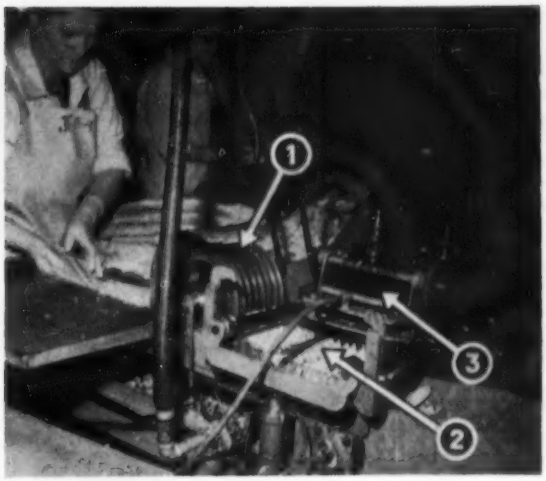
The retort is filled with 56-deg.-F tap water and left for the night after intake and drain valves have been "cracked" to permit circulation. Then in the morning, the water is drained, leaving thawed fish, which have been cleaned of slime, blood, and ice.

This method achieves not only efficient thawing but makes the fish easier to handle and results in a cleaner plant.

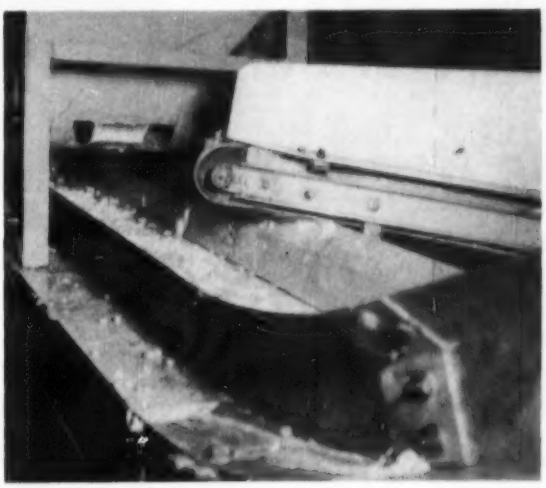
Remaining in the retort, the fish are now pre-cooked at 218 deg. F. (3 psi.) for 1-hr. This results in firm fish that are easily handled, even while hot. The dollies of trayed fish are then wheeled from the retort to a point behind the cleaning table.

Five women work at this 14-ft.-long table. They remove salmon from trays to table, clean the fish, separate it into

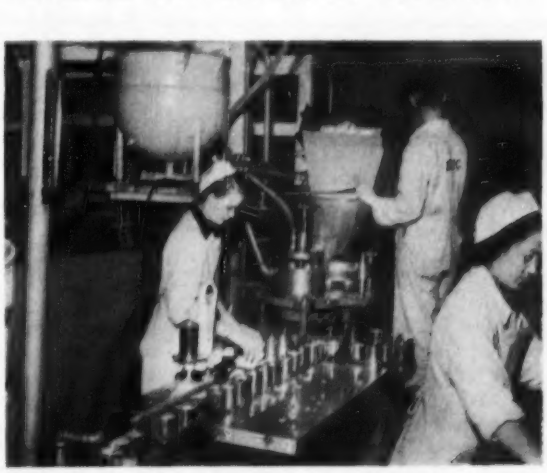
(Turn to page 151)



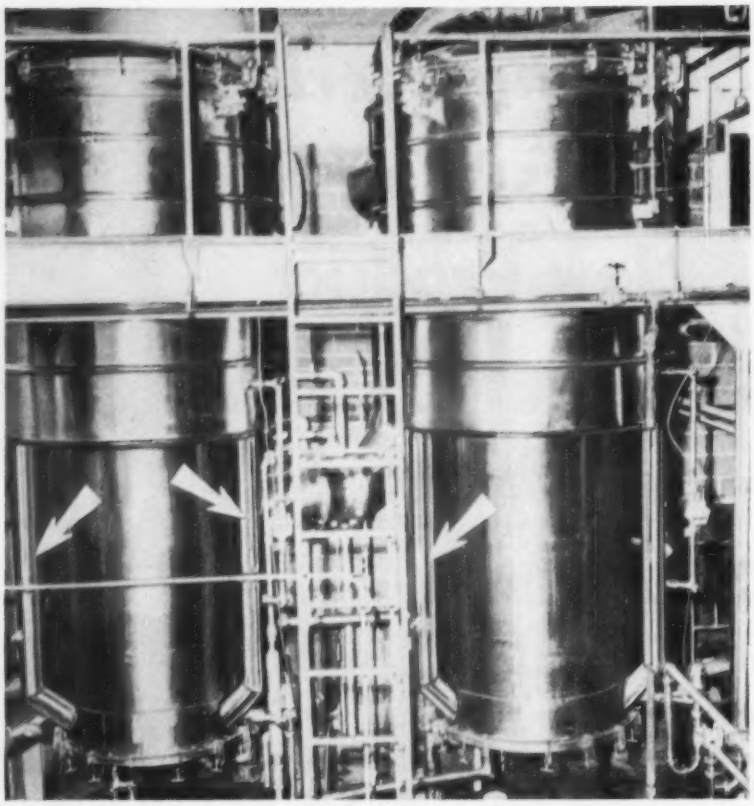
A GANG-KNIVES (1) slice fish fillets into strips. These go on slotted conveyor (2), which is synchronized to halt while reciprocating knives (3) make cross cut to form cubes and retract. Then action repeats.



B FISH CUBES fall from belt (right) onto main conveyor. Dispenser (rear) drops measured amounts of macaroni into flow. Another metering unit adds peas.



C CANS MOVE through filler (rear), are next check-weighed, then the water and salt are added.



BIG SAVING in space—note compactness and low height—marks this new evaporation equipment. Installation area is mere 9x14½x23 ft., one-third less than required with conventional units of similar capacity. Note external tubes (arrows) that convey partially condensed product from top of one stage to bottom of next. Drawing (opposite page) gives design details.

2 Effects Do Work of 4 In New . . .

6-Stage Steam-Jet Evaporator

Using entirely new approach, unit employs recompression and short tubes to effect low temperature evaporation with economy of steam. Improved vapor separator cuts product losses. Automatic controls up efficiency

ARTHUR V. GEMMILL
Senior Associate Editor, "Food Engineering"

From both management and plant personnel come plaudits for the new type double-effect steam evaporator recently installed at Aldovin Dairy, Tunkhannock, Pa., to condense skim milk prior to drying.

And similar units are operating successfully on such diverse products as tomato pulp, apple and grape juices.

Here are five outstanding reasons for the enthusiastic reception at Aldovin Dairy:

1. The unit's unusual operating economy—3.1 lb. of water are evaporated for each pound of steam used.

2. Savings in labor—automatic controls eliminate need for experienced pan operator. Once unit is started, the only manual operation is sampling finished product for solids content.

3. Easy cleaning by CIP method.

4. Minimum of product losses due to entrainment.

5. Savings in floor space—unit takes approximately ⅓ less area, and is about ⅔ as high as conventional triple-effect evaporators.

The new unit, made by Mojonnier Bros. Co., Chicago, is of tubular, rising-film design. Each of the two effects contains a nest of short vertical tubes (see diagram opposite page).

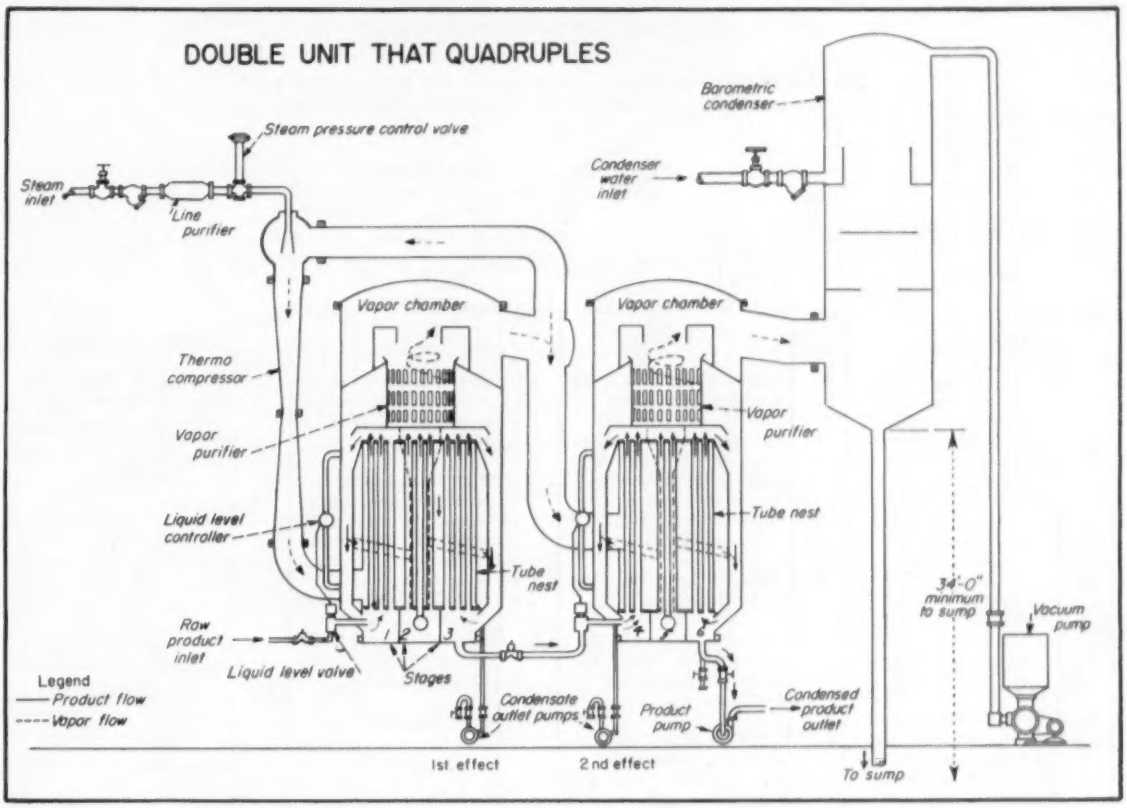
Six-Stage Operation

Employment of a unique baffling system (patent applied for) enables each effect to operate as a triple-stage evaporator, thus incorporating six stages in the two effects. This results in efficiency almost equal to that of the usual quadruple effect evaporator, and at an investment approximating that of a double effect unit.

The triple-stage operation is accomplished by vertical baffles welded to bottom and top of tube nests in such a manner that the spaces above and below them are divided into three separate, equal-sized triangles. By this method, the coils in each tube nest are isolated into three groups and, therefore, operate as three distinct evaporator stages.

Liquid to be concentrated enters first compartment in base of first effect of the evaporator. Level of liquid is automatically maintained at a predetermined height by a liquid level control that actuates the feed pump. As heat is applied, the liquid rises through the tubes in the first stage.

When it emerges (partially concentrated) it is diverted by the top baffles and flows down an external pipe to base compartment No. 2. Vapors rise to entrainment separator, where droplets of product are removed and fall back into the evaporator.



Liquid then moves up through tubes of 2nd stage, is further concentrated, then diverted to pipe that returns it to bottom compartment of 3rd stage. Leaving top of this stage, product flows to base of second effect and follows a path similar to the above.

Step-wise concentration, in the six stages of the evaporator at Aldovin, where skim milk of 8.8% solids is condensed to 42% solids, is theoretically gaged as follows: First stage, 8.8-12.4%; 2nd stage, 12.4-16.0; 3rd stage, 16.0-19.5; 4th stage, 19.5-27.3; 5th stage, 27.3-35.1; and 6th stage, 35.1-42.0 (see illustration below).

High Velocity Attained

Amount of liquid in the entire system is considerably less than that in a conventional unit of similar capacity.

This, together with the short tube design that causes product to move through evaporator at very high speeds, minimizes exposure to the heated surfaces, and increases rate of evaporation per square foot of surface, Latter is said to be approximately 46% greater than with single-stage units and 32% greater than with conventional double-effect evaporators.

Thermocompression, in which approximately half of the vapors from the first effect are compressed and mixed with 100-psi. steam to produce a heating medium at 165 F. for this effect, makes possible operation at about 135 F. Remaining vapors from first effect supply heat to 2nd effect, where evaporation takes place at 100 F.

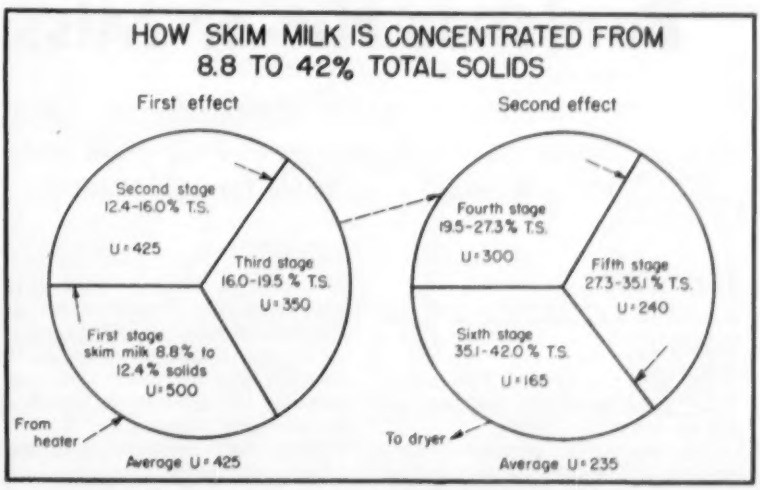
The low temperatures of the heating mediums and high velocity of product through evaporator prevent overheating and result in a finished product without cooked flavor. Also, development of skin on tube surfaces is minimized, thus enabling long operation without loss of capacity.

Further, the cleaning operation is greatly simplified. At Aldovin, evaporator is operated continuously for 16 hr., then cleaned in place (by circulating alkaline and acid solutions) in about 1 hr. 45 min.

An additional advantage of the short tube design is ability of the unit to concentrate products to high solids without use of circulating pumps.

Evaporator is equipped with an improved centrifugal type entrainment separator designed for maximum sanitation and efficiency. Actual tests at

(Turn to page 191)



Note: "U" represents overall heat transfer coefficients.

BASIC SCHEDULED-SANITIZING CHART

For Use of Plant Sanitarian--Designating His Primary Duties, Outlining CRITICAL Areas to be Sanitized, How & When

For 1st Floor Area--Macaroni Plant

The following tasks MUST be done as prescribed. However, the other sanitation jobs now being done which are not listed herein are also to be continued.

JOB #	WEEKLY	JOB #	SEMI-MONTHLY	JOB #	MONTHLY	JOB #	EVERY 60-90 DAYS
1	Check white traffic lane for insect or rodent evidence.	8	Every THREE WEEKS dismantle or open flour conveying equipment after same has been emptied of flour. Vacuum any remaining flour accumulations, then spot fumigate.	12	Residually treat all wall-flour junctures and window sills in flour storage room.	15	Residually treat undersurfaces of all skids and so tag and mark accordingly.
2	Check bait boxes for refilling, replacement, etc.			13	Vacuum all difficult to reach horizontal surfaces (such as overhead pipes) in flour dump room.		
3	Space spray.						
4	Spot sift and check as many cars during week as possible, using American Sanitation Institute method.	9	Residually treat all wall-floor junctures, window sills and frames, exterior of machinery, bins and conveyors in flour dump room.	14	Submit to American Sanitation Institute one sample of each of packaged noodles and macaroni.		
5	Vacuum all easily accessible horizontal surfaces in flour dump room.	10	Open or dismantle grinding equipment in floor dump room for vacuuming and spraying of interior with non-residual type spray.				
6	Residually spray wall-floor junctures and four-corner junctures of ALL outgoing box-cars.	11	Dismantle sifter for vacuuming and non-residual spraying of interior frames, etc.				
7	Check for rodent proofing.						

FIG. 1. THIS KIND of guide chart can put your plant's sanitizing program on a regular scheduled footing to insure that no critical area or equipment is overlooked. Sanitarian sets up a working calendar wherein each numbered task is assigned a definite date.

Banishes Hit-or-Miss Sanitation

Simple charts outline plant-sanitation hazards, prescribe specific treatment and frequency . . . Program is guided by progress reports to management . . . Sample forms illustrated . . . Procedures detailed

T. L. HUGÉ

The Huge' Co. and American Sanitation Institute, St. Louis

To face the fact of the matter, many plant sanitation programs are not all that they might be.

Too often these essential routines suffer from a tendency to concentrate on some areas or pieces of equipment more than is necessary—while giving other very critical spots much less than the attention really required.

However, simple checklists in the form of working charts can easily overcome this difficulty by equalizing the sanitizing efforts.

These charts put the program on a definite scheduled basis, and they channel the sanitarian's activities for maximum effect. Still another advantage is that they can be offered as documentary evidence of a plant's sanitation efforts and performance.

We will use the operations at a macaroni plant to illustrate the use of program charts. Naturally, these can readily be modified to fit the requirements of your own specific food-processing setup.

DAILY JOB SCHEDULE REPORT OF TASKS ACCOMPLISHED

From Plant Sanitarian to Management

Submitted by: E. McG.

Approved by: L.S.M.

Tasks Accomplished	Time Req.	Job #	Condition Noted	When Task Will Be Repeated	Material Used	Amt.	Amt. left	Recommendations or Help Needed
Checked bait boxes on 1st floor for refilling, replacement, etc.	1 hr.	2	3 live adult saw-toothed grain beetles in Bait Box #2	4-21-55	Rival cereal bait Pivalyn	3 lb. 1 gl	1 lb. Capt	Certain sections of 1st floor material are stored against wall, preventing good rodent control practice.
Spot-sifted 6 bags of shipment #32621, using American Sanitation Institute method.	2 hr.	4	2½ live adult stored-pest pests per bag sifted management notified.	4-21-55	30-mesh screen			This is 3rd time this month this brand Semolina has been infested in excess of 2 insects/bag. Supplier should be reprimanded or discontinued.
Dismantled sifter, thoroughly vacuumed and applied residual insecticide to interior, frames, etc.	2 hr	11	3 live confused flour beetle adults under felt gasket.	4-28-55	mist spray	1 gal.	35 gal.	I have asked before that engineering dept. replace felt gasket with another of tighter fitting material.
Residually treated under surface of all skids on 1st floor and tagged each one accordingly	2 hr.	15	no insects observed	7-14-55	Residual formula 2-A	6 gal.	15 gal.	4 of skids treated, marked in red chalk, need repair, since large cracks present could harbor insects

FIG. 2. FROM THIS DAILY FORM, management gets a frequent view of specific jobs, conditions found, treatment materials used, and their amounts. Further, it can quickly answer the sanitarian's "calls for help" (last column) to cope with insanitary conditions.

To begin with, management itself, preferably with the aid of a sanitation consultant, should designate the potentially dangerous areas, techniques, or pieces of equipment. The average macaroni plant may have 15 or 20 hazards calling for particular treatments at prescribed intervals.

Next, it is necessary to decide on proper control methods and how often they should be practiced. Then there should be devised a basic chart for guidance in carrying out the periodic inspection and control duties.

Now to our checklists:

Sample Sanitizing Chart

The basic scheduled chart (Fig. 1) considers the entire first floor of the plant as a critical area. In other cases, the target might be a single piece of equipment, such as the flour dump, a mixer, or a continuous dryer. Note that the chart classifies the checks and treatments in periodic columns—weekly, semi-monthly, monthly, and every 60 to 90 days.

Here are spelled out the definite jobs to be done at those intervals at critical points throughout the first floor. These tasks are numbered. Accordingly, the plant sanitarian sets up a working calendar wherein the dates are marked off for the routines.

Daily Job Form

Another vital checking tool is the daily report (Fig. 2). The sanitarian submits this to management every working day to insure a successful, continuous program.

Note that the tasks (left column) follow those listed on the basic chart. Space is provided to show the time consumed on a particular job, any unusual conditions noted, and when

(*Turn to page 191*)

RODENT CONTROL REPORT

From Plant Sanitarian to Management

From: 4-1 To: 4-31

By: E. McG.

Approved: L.S.M.

Feeding in Bait Box #	Where	Trapped Rodents in Trap#	Where & Number	Number Dead Rodents	Rodent Evidence Noted	Why	Recommendations
6	N.E. corner, flour dump room	3	Packaging Rm 3 mice	5 – during month	Rodent gnawing and excreta in S.E. corner of flour storage room	Poor storage with	Bldg. shipping dept. to store empty from walls.

SPECIAL FLOUR SPOT-SIFT TEST REPORT

From Plant Sanitarian to Management

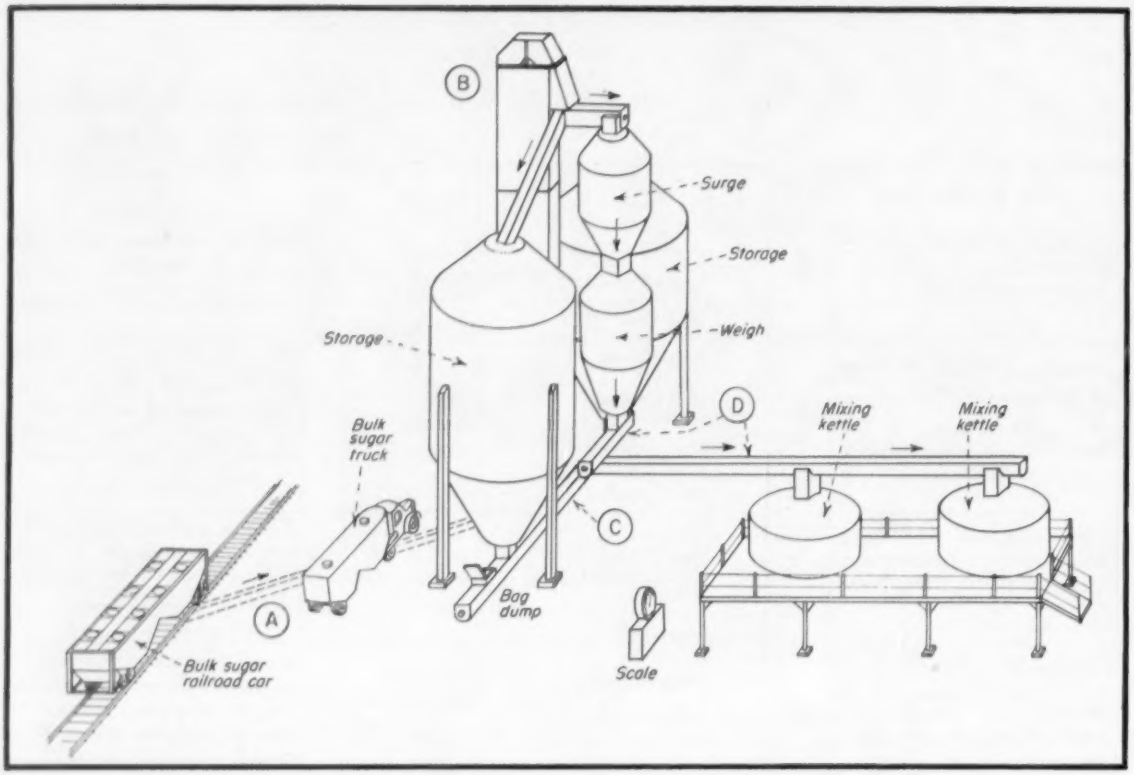
Test Date: 5-17-55

By: E. McG.

One report for each supplier tested

SUPPLIER	LOT NO.	NUMBER BAGS SIFTED	INSECTS ON EXT. OF BAGS	AVG. LIVE INSECTS PER BAG	AVG. DEAD INSECTS PER BAG	AVG. INSECT FRAGMENTS PER BAG	CONDITION & DATE (SAME SUPPLIER) LAST TIME TESTED
R.K. Milling Co.	X135	8	3 live saw-toothed grain beetles in outside of 8 bags	4	3	1	Supplier checked Feed May 200 Conditions were generally unsatisfactory. Mill D. - Jan 2000 Shipment held in regard to cond. and improved

FIG. 3. SUPPLEMENTARY REPORTS can play integral role in overall program. Shown here are headings of comprehensive forms covering rodent control (top) and checking of incoming shipments of flour (above).



SUGAR IS MOVED from truck and car by underground conveyor (A). Going into boot (not seen) of elevator (B), it is raised to top and then dumped into surge bin (feeding directly to process) or storage bins. When stored sugar is required by process, silo-feed conveyor (C) brings it from right or left bin to center and back into elevator boot for lift to surge bin. Worms at (D) carry weighed sugar to syrup mixing kettles.

Pushbutton Bulk Flow Wins *Big* Saving

Handling operation of Long Island processor is already $9,000 "to the good" using simple, sanitary system that speeds sugar from truck to kettle at 35 tons an hour

ERNEST H. MOORE
Broker & Sugar Economist

Advanced materials handling, for both raw materials and finished products, keys low-cost operation at the new Maspeth, N. Y., plant of Canada Dry Ginger Ale, Inc.

Outstanding here is the pushbutton handling and storing of dry, granulated sugar—geared to a yearly capacity of 37,000,000 lb.

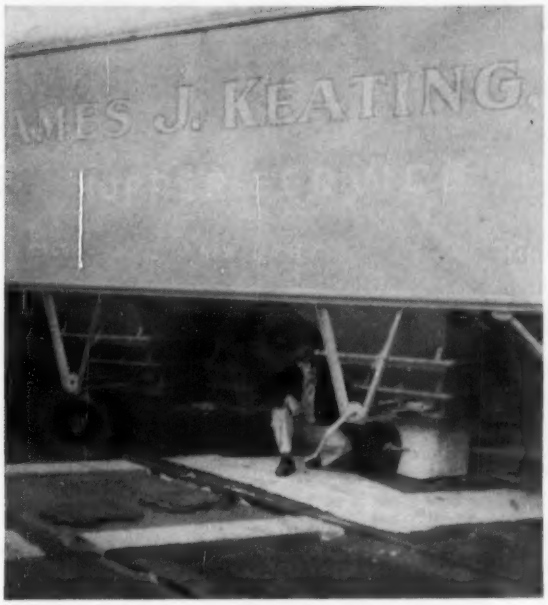
This design saves 52c. for every 100 lb. of sugar used, say company officials. Of this total, 30c. is bulk-vs.-bag differential. And then an additional saving of 22c. in labor is realized through the complete mechanical handling.

At present production, this works out to net annual savings of $9,000 ($14,000 gross minus $4,600 depreciation and an estimated $400 in maintenance). Thus, installation cost ($46,000) will be recovered in five years.

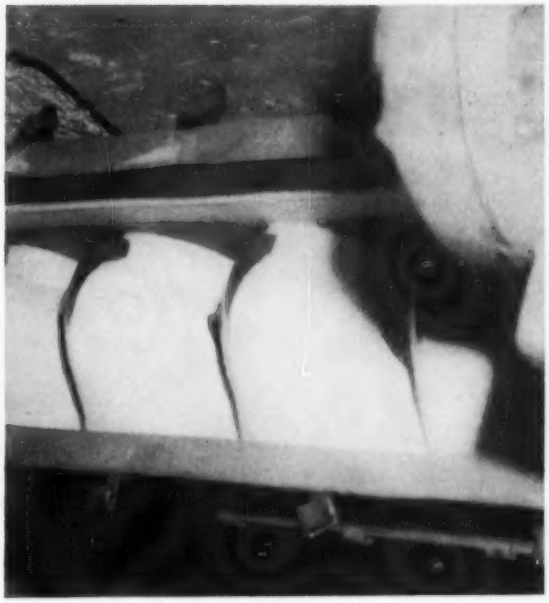
Simplicity, flexibility, and ease of sanitation are further features, with streamlining of machinery down to just the units needed to move sugar the shortest possible distance from receiving to processing.

Unloading Operations

A single, water- and dust-proof, underground screw conveyor receives sugar from bulk hopper trucks at the rate of 35 tons per hour. Provision is also made for emergency unloading of railroad bulk cars and bag-sugar.



DELIVERY is by a new-type truck. The two-hopper design permits complete emptying without use of a lift mechanism. Sugar flows through canvas sleeve to . . .



. . . **UNDERGROUND WORM** conveyor that moves product from truck to boot of elevator. Clamp-cover has been removed from conveyor to show action.

The receiving screw feeds sugar to the boot of a chain-and-bucket elevator, located centrally below the two 150,000-lb. storage silos. Boot can receive sugar from four serving facilities—railroad car, truck, and either of the storage bins.

The elevator has a working capacity of 50 tons per hour. Sugar is discharged at the top onto a short, 30-ton-per-hr. screw conveyor that moves it to a surge bin. Here, sugar level is controlled automatically by a high-low device inside the hopper.

When level falls to the lower setting, controls start (1) the short screw feeder, (2) elevator, then (3) bin-transfer worm located under both storage silos, and (4) the rotary-vane feeder gate in bottom of storage bin.

When surge bin is full, equipment shuts itself off in reverse order.

Making Syrup

For each mixing tank, production is geared to a sugar batch of 15,000 lb. (amount held by surge bin, also scale bin directly under it).

At the syrup room control panel, a scale dial is equipped with a weight indicator that can be set from 5 to 15,000 lb. Usually the setting is the full 15,000.

When personnel require sugar, they press a button. This starts the surge bin rotary feeder, and sugar then passes through a flexible connection at the top of the scale bin (at rate of 52½ tons per hour). A scale dial Mercoid switch stops feeder in closed position when desired weight is obtained.

Two screw conveyors (16 in.) move sugar from scale bin to mixing tanks at a 52½-ton-per-hr. "clip"—15,000 lb. in 8¾ min.!

Heating, dissolving, flavor mixing, and pumping of finished syrups to storage involves a 20-min. cycle. In this interval, controls deliver another sugar batch to scale bin for charging the second mixing tank.

If sugar is being received while not required in production, feed screw to surge bin is shut off, and product flows down two 10-in. spouts into the storage bins.

With this overall design, sugar can move from rail cars and trucks to both storage bins and to the processing line at the same time.

Two other circuit combinations permit simultaneous recirculation, transfer of sugar from one storage bin to the other, and movement to production.

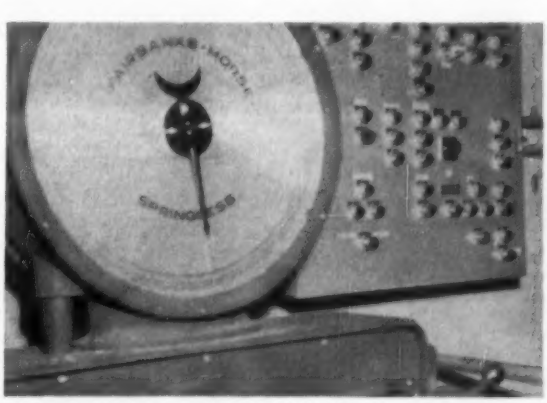
To prevent overcrowding the elevator, automatic control prevents sugar from being drawn from two storage bins at once.

A by-pass spout, located at bottom of the scale bin, can return unused sugar from scale and surge bins to the boot elevator.

Doors Aid Cleanup

The entire handling system is dust-proof. Included in all equipment are doors. And cleaning via these panels prevents carry-over from one unit to the next. These doors are sealed with spring-clamp covers and neoprene gaskets.

The 200,000-sq.-ft. plant has an annual capacity of 7,000,000 cases, and there is built-in room for future expansion.



SCALE can be set to deliver 5 to 15,000 lb. of sugar. Push-button control panel (right) governs operations.

1 **TOTE BIN CAR** (left photo) carries convenient shipping composite of 28 individual containers. It is accepted by railroads at carload rate without empty return freight charges. After loading with 3,000 lb. of flour, each bin (right photo) is hermetically sealed.

BULK-BY-RAIL SYSTEM
Cuts Shipping Cost and Labor

More than $200 saving is realized per load by transport of bin units on newly designed rail car . . . Special rigging safely secures blocks of 28 containers. And at destination all are taken off by a single man in a mere half hour

FE STAFF

In stimulating the trend toward shipment in bulk of such food plant supplies as flour, sugar, etc., General Baking Co. has for many years been an active "catalyzer."

Latest accomplishment of this company has been a 400-mile shipment in bulk of a carload of flour to one of its bakeries not situated on a rail siding—with these advantages:

1. Elimination of in-transit and handling of flour losses.

2. Improvement in over-all plant sanitation.

3. Appreciable reduction in materials handling man-hours.

4. Indicated dollar savings per shipment of more than $200, as compared with car of bags.

Here are the details: At the George Urban Milling Co., Buffalo, the flour was loaded into 28 Tote Bins (FE Sept. '51, p. 83 and Oct. '54, p. 64). Each bin (74 cu. ft. capacity) contained 3,000 lb. (total 84,000 lb.).

When filled, these bins were secured on a special rail car. At specific points on the bed of this car are steel-plate recesses. Into these are anchored the legs of the Tote Bins. And their sides are retained by car uprights extending above their tops. Cross members, from side to side above, combine the bins rigidly, to complete the arrangement of the series of bins into a composite carload.

These security features of the new car design avoid the damage the bins had suffered in trial shipments in conventional box cars.

At Worcester, Mass., the receiving point, the bins were removed from the car with the aid of a Lewis-Shepard jack lift. One man performed this task in 33 min., depositing the units on a railroad company loading dock. In contrast some 12 man-hours are commonly required to empty a carload of flour in sacks.

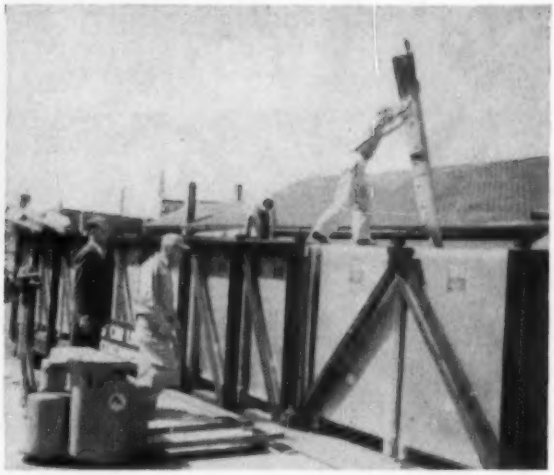
Of course, this unloading of the car was at some distance from the receiving plant. However, the whole operation of removing the bins from the car and delivering them into the plant was estimated by the company as taking less than 2 man-hours.

To plants having no RR siding facilities, or otherwise remote from a railroad, the bin units for bulk handling (Tote System, Beatrice, Neb.) offer many worthy inducements in the way of new efficiency, as well as favorable cost factors in respect to carload freight rates and handling.

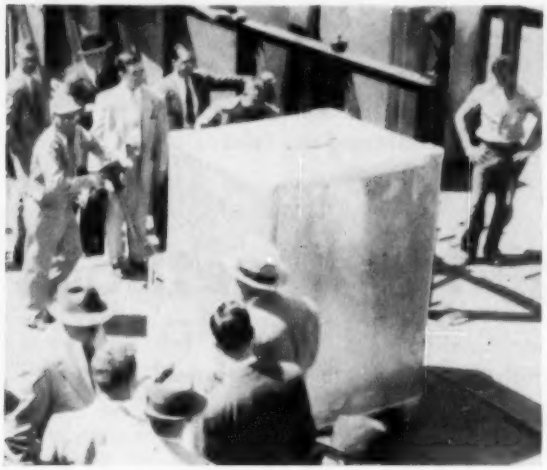
The platn having an RR siding also can find advantage in this bulk system, since the bins not only serve as shipping containers but also as storage units which can serve as hopper feeding into the processing line.

Of course, counting in the new cars (built by American Car & Foundry Co. for its subsidiary, Shippers Car Line Corp., New York City), outright purchase of all equipment would require a prime investment. However, a company may buy an ample number of bins and then lease the necessary cars, or lease both bins and cars.

2 **JACK LIFT** speedily transports bins and aids in spotting bin legs in recessed floor anchorage.

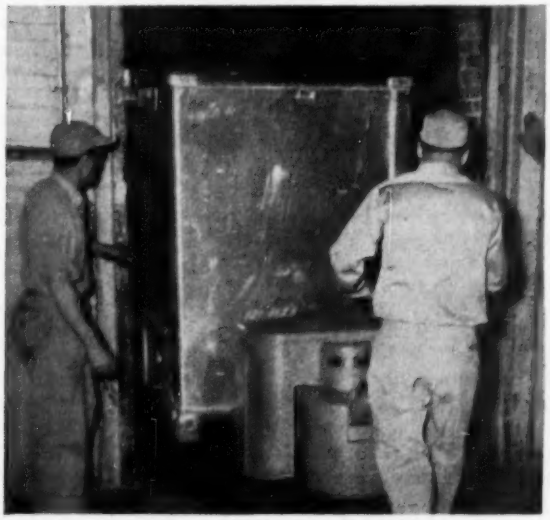


3 **CAR** arrives at destination RR siding, where top closures are removed and opening made into side.

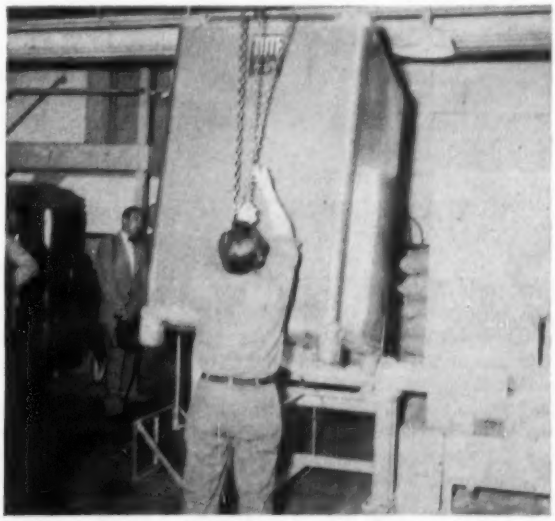


4 **FILLED BINS** of flour are unloaded from car by one man employing a lift jack. He clears car in 33 min.

5 **TRUCK TRAILER** is used to transport the bins of flour from railroad siding to the bakery.



6 **POWERED JACK LIFT** takes containers into plant, where they serve as temporary storage bins.



7 **TILTED BIN** is elevated by hoist to serve as dustless feed hopper for delivering flour into process.

"Candy profs" in 2-day session at Lancaster, Pa., told . . .

Candymakers Gage New Methods

One-shot fudge • Radiant cooling • Continuous conditioner
Tempering coating • Cooling chocolate • Preparing centers

FE STAFF

Better processing techniques were discussed at the recent annual production conference of the Pennsylvania Manufacturing Confectioners' Assn. in Lancaster, Pa.

These techniques step up production, improve quality, and extend shelf-life.

NEW-WAY FUDGE

A simple, "one-shot" system of continuously making fudge and cream was discussed by W. I. Gorfinkle, J. D. Whitten Co., Inc. It involves the use of a newly-developed gelatin with additional properties such as a 300 to 350-Bloom strength.

Unlike conventional method of making cream and fudge, in the one-shot way, all the ingredients are mixed while fluid, with 0.8%, or less, of extra-high strength gelatin added to the batch. Remelting of fondant is not required. The fluid is whipped and aerated in any kind of marshmallow beater, and then cast. This fudge can be cast, or it can be poured onto tables and cut, or into aluminum trays or waxed boxes, then cooled and packed.

At present, it is believed best to use a continuous beater-type heat-exchanger.

New method is based on the development of extra high-strength gelatin with two desirable properties:

1. Setting in low concentrations (less than 0.8%) without producing a gummy candy, and producing a very short confection. (There's enough colloidal protection to control size of sugar grain.)

2. Whipping of this gelatin in the presence of fat. Bubble formation in this sugar syrup-fat-gelatin whip is small. There is no frothiness.

In this method, fondant, bob, and frappe are made at the same time and in the same place—hence the term "one-hot."

New method of making these pieces works with high sugar, low corn syrup, or with lower sugar and higher corn syrup mixtures. More invert sugar must be used, thus pieces mellow more quickly.

It so appears—probably due to setting power of the extra-high strength gelatin—that higher moisture candies can be made.

One-shot fudge liked by most was made by: Boiling 60 lb. of sugar and 16 lb. of water, and then adding 30 lb. of corn syrup, 10 lb. of invert, 1 lb. of skim milk solids (in solution), and 2 oz. of salt.

Boiling is continued to 236 F. Batch is then cooled to 160-170 deg. F., following addition of 0.8 lb. of extra high-strength gelatin in 3 lb. of water. After thorough stirring, 12 lb. of chocolate liquor and flavor are added. The batch is whipped at 130 F. to 9 lb. per gal. and deposited in trays.

For a fudge with more grain, use a syrup with 66 lb. of sugar, 17 lb. of corn syrup, and 17 lb. of invert sugar.

For a home-made type fudge, use

. . . "Candy students" the why's and how's of better candymaking

a syrup made with 75 lb. of sugar, 5 lb. of corn syrup, and 20 lb. of invert sugar.

Gelatin holds some moisture, and the piece does not dry out as quickly as would be expected with the low fat content.

Cream centers are made in a similar manner but, of course, without the chocolate, milk, and salt. For creams, the 75-5-20, or high sugar formulation tested best.

After gelatin is incorporated, flavor and invertase, as desired, are added. Found helpful, at this point, was the addition of 1 lb. of fondant or 0.5 lb. of powdered sugar, which quickly sets up the center by starting crystallization.

System works better when batch is whipped or aerated to a weight between 7½ and 9 lb. per gal., since many people prefer fluffy fudges and creams.

These pieces are smooth, light, and easy to eat. When eaten, they show no signs of gelatin—no chew at all. They can be made firmer by cooking the syrup higher.

Sugar content in the 60-30-10 formula is high enough to give some grain, while the remaining sugars are non-crystallizing. They'll stay in solution to give a heavy density syrup which will cut down chance of fermentation.

This 70-30 sugar-corn syrup ratio gives a piece that has a slight "bite", which is considered desirable in a cream by some. Most people seem to like a shorter cream. For large pieces, like mint patties, the 66-17-17 sugar-corn syrup-invert ratio seemed desirable.

For this, make a syrup with 66 lb. of sugar, 17 lb. of corn syrup, 17 lb. of invert sugar, and 16 lb. of water. Cook to 234-236 F. Then cool to 170 F. and add 0.6 to 0.8 lb. of extra high-strength gelatin soaked or dissolved in 3 or 4 lb. of water. Stir thoroughly and gently cool to 130 F. Invertase, flavor, and color are added, as desired.

Add to the cream batch 1 lb. of fondant (extra fine sugar crystals) or ½ lb. of fine powdered sugar. Batch is whipped to an 8-lb.-per-gal. weight and cooled to 100-105 F., if a cooling-type beater is used.

Pieces are cast in dry starch, allowed to stand until ready, and sifted out. The time depends upon the cook—the higher the cook, the faster the piece can be brushed out.

Addition of fondant helped start the grain and speeded setting-up of the piece. This addition may not be necessary in a continuous beater that can rapidly cool the batch. Preliminary checks showed that rapid cooling will form fine grains.

Fine texture could not be obtained with conventional marshmallow beaters. Continuous beaters, with their forced whip and much more thorough agitation, will give most desirable textures.

NEW RADIANT COOLING

Interesting results with radiant cooling were reported by E. H. Morgan, Reflectotherm, Inc. Chocolates cool to a higher gloss with this technique. Interior heat is rapidly taken out of candy canes. Centers are conditioned—heated or cooled—by radiant transfer of heat.

Tests were made on tunnel vs. radiant cooling of sandwich-type crackers from 87 to 77 F. in 2½ min. Cooling temperatures were 45-F. in tunnel and 34-F. from radiant coils.

By promoting release of heat from the center, the radiant-cooled sandwich filler was cooler, set up firmer, and did not finger-shear.

Other radiant heat-transfer applications include: (1) Cooling packing rooms with heavy production loads; (2) cooling wrapping operations involving heat-sealing, and (3) radiant-heating bakery proof rooms with closer control.

CONTINUOUS MELTER

These advantages were cited by Fred Greer, J. W. Greer Co., for a new continuous chocolate conditioner: (1) Speedier start-ups without need of advanced preparation of chocolate. (2) More rapid, complete melting of chocolate at controlled temperatures. (3) Elimination of additional storage and kettle space. (4) More efficient

cooling, with low water consumption. (5) Better viscosity control, resulting in more uniform product coverage.

The 500 to 1,000-lb.-per-hr. units operate in this manner:

Chocolate blocks drop from receiving hopper to the melting unit onto a hollow, rotating drum. Automatic controller maintains melting drum at a predetermined temperature. Thin-film-melted chocolate is scraper-removed from roll, screened, and dropped into a water-jacketed storage tank with agitator.

Melted chocolate is then pumped to the thin-film heat-exchanger, where cooling takes place as chocolate is forced through a close-tolerance tubular area (see diagram). Cooler comprises an outer circular shell and inner rotating tube, with cooling water circulated within outer shell and inside of rotating tube.

Temperature is controlled by a Taylor Fulscope instrument with sensing element in chocolate-outlet line. Controller—an air-actuated unit—meters amount of cooling water admitted to water-circulating system to maintain pre-set temperature.

TEMPERING COATING

Tempering confectioners coatings varies with the type of fat used, reported Norman W. Kempf, Walter Baker Div., General Foods Corp. If the fat is prepared from domestic oils, it is likely to have a wide melting point range with a high stearin content. Users report that little attention need be paid to tempering. Seed crystals of the high-melting (138 F.) stearin are easily formed, and they always are present below the melting point of this fat.

But greater volume of coatings is produced from tropical fats with lauric acid. These fats have special desirable texture characteristics. By suitable fractionation or ester rearrangement, a fat can be made with a narrow melting-point range—a desirable characteristic of cocoa butter. Fats of this type require proper tempering for good gloss and shelf-life.

Like cocoa butter, these polymorphic fats must set up stable seed crystals before proceeding with the final setting up of the fat. **This can be accomplished by: (1) Slow agitation-cooling for the highest melting-form fat to establish crystal nuclei without less stable fats forming them. (2) By rapid cooling and then reheating to destroy unstable forms which start, while preserving stable nuclei as the final seed.**

Because of the number and variations in properties of fats available for manufacturing confectioners coatings, exact tempering information is needed from coating manufacturer.

Successful practice consists of bringing the coating to the enrober in slight "mush" form, immediately reheating to operating temperature, and then continuing throughout the day by either drip- or bucket-feeding coating at a constant operating temperature. This method takes advantage of the normal heat loss from the enrober to produce a continuing supply of stable seed.

It is important to avoid the use of very cold water in the jacket of the line from pump to spreader, as the locally produced low temperature can form unstable seed crystals in coating. Crystals formed at this critical point will be in the coated candy and prevent proper latent heat removal in the cooling tunnel.

Experience with confectioners coatings indicate that, once a proper seed has been established in the enrober, there is less danger of losing it by temporary overheating than is the case with true chocolate.

One of the chief troubles encountered has been loss of gloss due to overseeding the coating. When this occurs, the size of the seed crystals builds up to a point where a grainy surface is formed on the coating and gloss is lost because of surface roughness.

COOLING CHOCOLATE

For chocolate cooling tunnels, A. T. Newth, Nestle Co., Inc., prefers temperatures no lower than 52 F., with a relative humidity of 55% or lower. This temperature refers to the packing end, where air is picked up and blown counterwise over the goods. Air should be introduced under the belt at the enrober end of the tunnel, and its temperature should be no higher than 45 to 50 F. The air is directed toward the packing end, and a small portion of this air should be circulated under the stringing table, which should always be enclosed.

Longest tunnel and travel are recommended. Flow of 65 F. should be baffled so that it does not strike the wet, freshly dipped centers for approximately 2 min. This develops a setting film, or sheen, in which most of the sensible heat is given off. As the goods progress through the tunnel, more air at lower temperature is desirable.

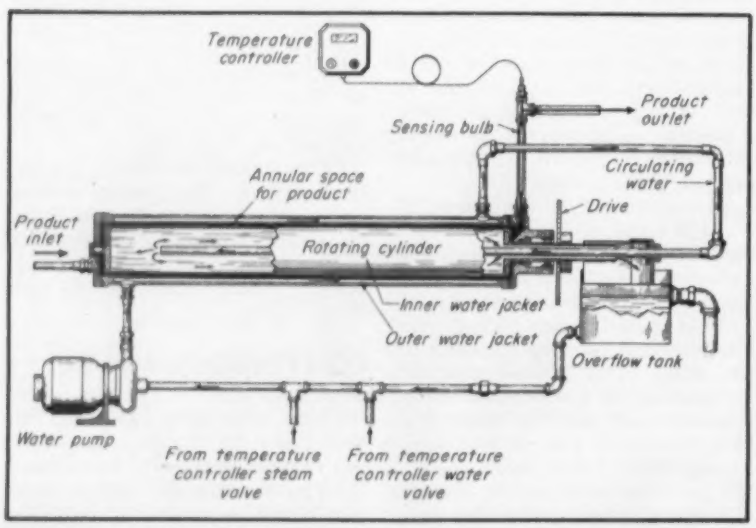
Previous to enrobing air should be shut off until the tunnel is about one-third to one-half filled with dipped centers. Air temperatures in tunnels drop too low very quickly when no product is entering the tunnels. Too low a temperature can detract from the gloss of the finished piece.

Favored by Mr. Newth is a 22 ft. open belt from enrober to tunnel entrance. Ten feet of this is in the enrober room (serving as a stringing table) and 12 ft. in a 65-F. room. In addition, there is an 80-ft. cooling tunnel.

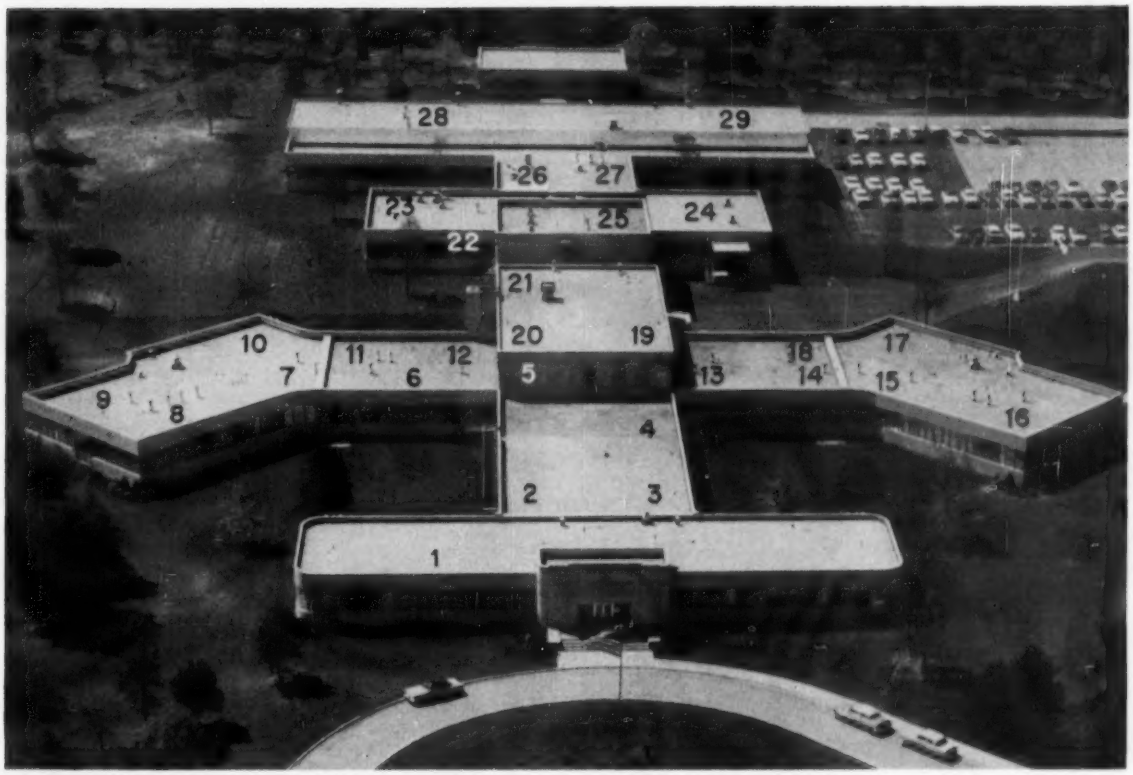
Finished goods from this set-up are about the best enrobed seen. They are well dried, have shiny bottoms, and can be covered when packed with no apparent damage. After two years' storage, they still remain in excellent condition.

Using a needle thermocouple on a

(Turn to page 143)



THIN-FILM HEAT-EXCHANGER: Chocolate from melter is pumped through close-tolerance tubular area, temperature controlled, in this Greer unit (patent applied for). Product flows through annular space between turning cylinder and shell. Heat-exchange water circulates through shell jacket and cylinder.



NEW CANCO RESEARCH CENTER at Barrington, Ill. Staffed by 148 scientists and technical specialists, it employs more than 500 pieces of advanced equipment in about 50 rooms. Numbered on this air view are locations of Administration Offices (1), Accounting & Purchasing (2), Library (3), Engineering & Drafting (4), Instrumentation (5), Special Investigations (6), Spectroscopy (7), Analytical Chemistry (8), Food Chemistry (9), Food Packaging (10), Vitamin Assays (11), Bacteriology (12), Metal Bonding Cements & Plastic Film (13), Fiber Containers (14), Plate Surface Physics (15), Mechanical Engineering (16), Medical Department (17), Organic Coating Chemistry (18), Rubber Technology (19), Metallography (20), Non-Food Packaging (21), Production Techniques (22), Organic Coating Formulations (23), Canning Pilot Lines (24), Sheet Metal Testing (25), Organic Coating Application (26), Sealing Compounds (27), Can-Making Pilot Lines (28), and Machine Shop (29).

PACE-SETTING RESEARCH

More extensive probing into food and container technology is assured in Canco's new research center . . . Goal set for development of tinless cans and other improved containers . . . Notable advances made in tin-replacement metals, aluminum cans, side-seam welding, side-seam cementing, and paper containers

JOHN V. ZIEMBA
Associate Editor, "Food Engineering"

Four prime factors—skillful organization, well-directed research, excellently equipped laboratory and pilot-plant facilities and "cream-of-the-crop" scientists—have been teamed to achieve utmost performance at American Can Co.'s new scientific nerve-center in Barrington, Ill. This research and development laboratory reflects 20 years' planning. It was especially designed, engineered, and man-powered to develop and perfect "the containers of tomorrow," according to Canco President William C. Stolk.

Pattern set by this strikingly expanded research facility should invite the attention of all progressive food processors.

The center will deeply probe container-use problems, aiming its scientific sights on the role canned products will play in the next half-century —destined to be the most significant packaging era.

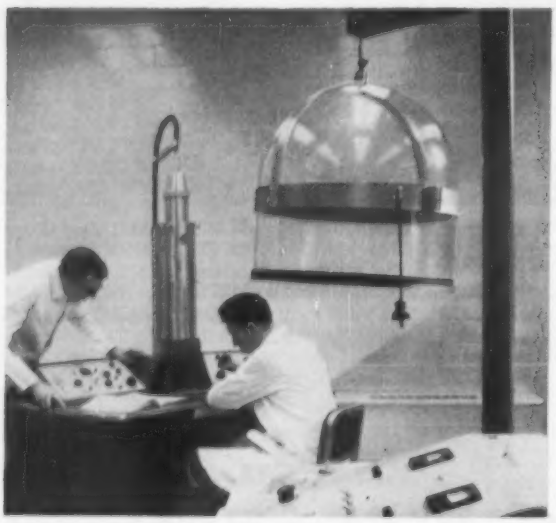
About the Construction

The new facility (photo above) occupies 102,000 sq. ft. of floor area, with the special-purpose laboratory

Advanced Instruments Aid Research

EMISSION SPECTROGRAPH is employed for rapid analysis of metals and for obtaining visual records of minute metallic impurities in foods. In room (left) is equipment for developing film to show immediate test results.

BETA GAGE measures thicknesses of films. Magnitudes of beta scattering from film or steelplate is influenced by thickness and type of sample. Source employed by this nuclear device is strontium 90.



ELECTRON MICROSCOPE magnifies objects 30,000 times. Here, in exploratory research branch of the laboratory, technicians are examining pigment components of organic coatings for metal containers.

RECORDING SPECTROPHOTOMETER (foreground) distinguishes over a million different colors and hues. Instrument is employed to control and specify the various lithographic inks.

structure surrounded by a beautifully landscaped 40-acre tract.

Built in a series of inverted "T's" interconnected by a central passageway, the structure provides outstanding lighting in all laboratories and testing areas. Air conditioning is a feature. And illumination is by overhead-recessed lights.

Advance Equipment

In addition to the normal complement of conventional facilities, more than 500 specialized pieces of major research equipment are used in the center's 50 separate laboratory sections.

There has been special emphasis on provision of the most advanced equipment for application of physical methods for measurement and analysis. Included are: Recording spectrophotometer, electron microscope, infra-red absorption spectrograph, X-ray diffraction unit, polarograph, emission spectrograph, and metallograph.

The reference library has about 2,000 bound volumes and 2,500 technical publications.

Scope of Researches

Canco is focusing its research sights on the innumerable problems of packaging, and related marketing, of more than 10 billion pounds of food, plus billions of additional gallons of beverages within the next two decades.

Research will pinpoint critical investigations for specific needs. Current work will be devoted to continued improvement of containers to provide greater protection and longer shelf-life for canned foods.

A wide perspective is ranged by R. H. Lueck, vice-president of research and technical department: Canco's extensive investigations are directed to new methods pertinent in canning technology, biochemistry, bacteriology, and "cold sterilization" by nuclear fission products, also to new materials for container manufacture.

Its container-making research involves metallurgy and corrosion control. Further there is the work on organic coatings, adhesives, waxes,

Ultra Modern Analytical and Bacteriological Labs

GENERAL PURPOSE analytical laboratory is equipped with the most modern facilities. Primarily it performs services for other research groups.

WALK-IN TYPE INCUBATOR is invaluable in bacteriological work. Among other units is a thermal resistometer to test thermal death rate of spores.

paper chemistry, soldering and welding methods, plus mechanical engineering aspects of container construction.

Tomorrow's Containers

Priority-listed among long-range research is the quest to eliminate this country's dependence upon tin as a can-making material.

Called "Operation Survival", this project is seeking tin alternates. Reason is that major overseas tin sources lie in the path of communist aggression.

Expected in the "containers of tomorrow" are a number of metals—each tailored to a specific need. Metals include steel, chemically-treated steel, aluminum, steel coated with aluminum, and alloy coatings and metal combinations. Plastics, too, will play an important role.

Combined with ultimate conversion from tin to other metals, however, are problems relating to the nature of alternate metals and end-use of containers.

Can makers are preparing answers for can requirements in both the frozen arctics and hot, humid tropics.

Research continues on atomic radiation of foods. American Can, government agencies, and the food industry are cooperatively investigating aspects of container needs in case of world-wide conflict threatening to be made serious by atomic blasts and germ warfare.

Meanwhile, there is constant planning to meet the changing habits of consumers. Canco is alert to the public's demand for convenience packages and its insistence on quality and an ever-widening variety of packaged products.

Tinless Cans

Eliminating the less-than-1% tin in metal cans has required new approaches to can-making materials and techniques. A variety of can-making materials will meet all requirements of all products commonly packaged in today's tin-plate cans.

Most future tin-free metal cans may come from steel or from steel with metal coatings other than tin. In some cases, the steel may be chemically treated or protected with organic coatings.

Search for tinless cans has re-awakened interest in rust-resistant chemically-treated steel (CTS), produced by processing sheets of plain steel through special solutions that alter surface chemistry. Emphasis is on continuous, economical ways of chemically treating steel coils at the mill. Results to date are encouraging and suggest chemically-treated steel as first alternates for tin plate.

CTS plate, however, is not as easily soldered as plain steel or tin plate. Nevertheless, extension of cementing techniques for side-seam closure is seen bringing use of CTS plate in cans holding items not requiring high temperature sterilization.

Canco's researchers are also checking on domestically produced tin-replacing metals such as zinc, nickel, aluminum, and titanium.

Aluminum and aluminum-coated steel show promise. For the use in question, this metal has both attractive and unattractive physical properties.

At the Barrington laboratory, drawn aluminum cans have been made experimentally, and various side seam-closure methods are being investigated.

Cementing of side seams offers greatest immediate promise for aluminum, and cans using the techniques are presently being evaluated.

Representative foods have been packaged and successfully held in drawn seamless aluminum cans for years by Canco's research laboratories. The experiments indicate eventual use of an alternate metal for canning a number of products.

Further investigated are coating techniques—like cladding, electroplating, and vapor depositing—with the aim of "marrying" aluminum to steel.

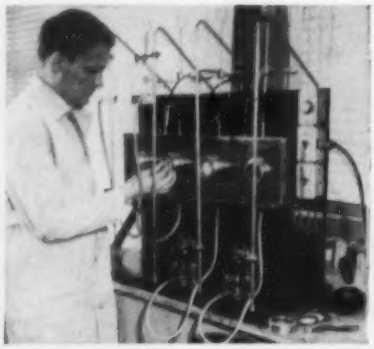
Among other metals, nickel has been considered for plating steel, and experiments with it indicate possible applications for certain products for which other materials are not suitable. Nickel-plated steel may be readily soldered at commercial can-making speeds on conventional can-making equipment.

Welding of Side Seams

Recently, high-speed welding of side seams has been accomplished ex-

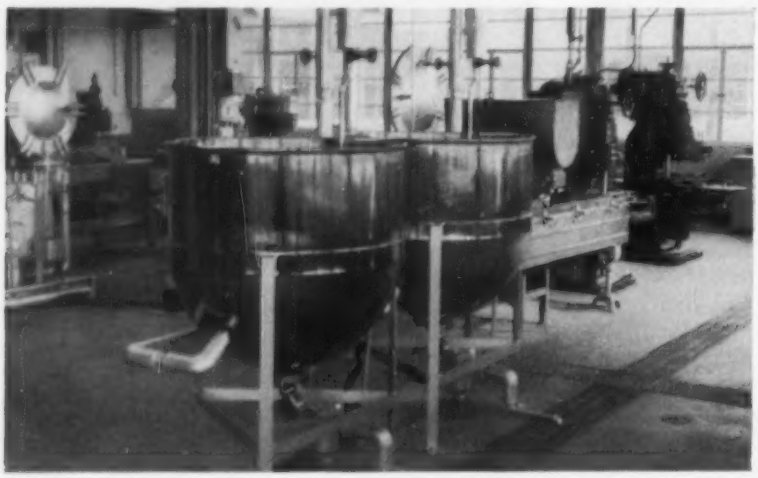
Further Food Container Research Proceeds in These Rooms

BRUSH SURFACE ANALYZER correlates plate smoothness, coating coverage, and rust resistance.



PENESCOPE measures resistance of fiber milk container paperboard to lactic acid penetration.

OPTICAL COMPARATOR is employed to magnify structural details of metal containers.



CANNING FACTORY in miniature: Canned food production and canning lines simulate commercial conditions. New experimental canning laboratory is used to discover new uses for known containers and create new ones.

TECHNICAL LIBRARY maintains 2000 bound volumes for reference, has more than 150 periodicals.

perimentally in Canco's research laboratories. It may be an important step to "tomorrow's container" and an entirely new approach in can making.

Side-seam welding offers advantages not available in conventional tin-lead soldering. Among them are:

1. Applying the welding technique to more metals. High-speed soldering is limited to a few.

2. Providing cans having great strength and making them more resistant to internal and external stresses and physical abuse (processing, handling, etc.) as well as producing a better package. Strength tests have shown that the can body will fracture before the welded side seam gives out.

3. Making available non-solderable chemically-treated steels for sanitary-type food cans.

4. Possibly offering a number of advantages on a commercial mass-production basis—eliminating can body-making steps such as notching, crimping, and bumping used in the soldered-side-seam technique. Maybe, through welded side-seam methods, and other manufacturing advances, future cans will come off production-welding lines at speeds equal to, or greater than, the current 450 per min.

5. Assisting the company in its service to all types of customers in any national emergency, assuming availability of steel and other metals.

Side-Seam Cementing

The cemented side seam represents one of the newest can-making techniques. And some such seam is seen preferable to soldered and welded side seams.

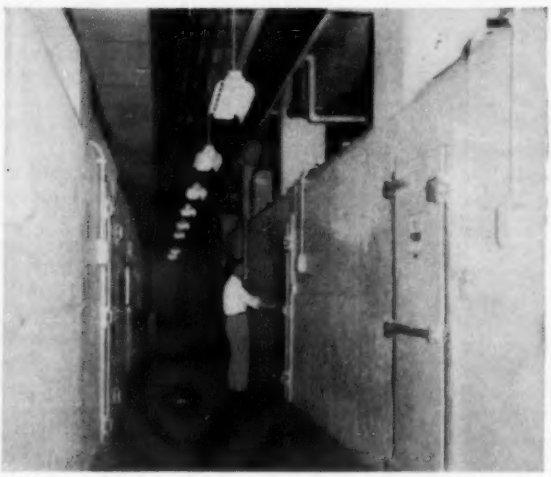
This phase of research is important in the search for tinless cans. It has led to Canco's perfecting (in cooperation with a supplier) of a plastic cement, Unimelt.

As a side-seam closure, this new thermoplastic cement eliminates the need of tin-lead solder. It strongly bonds layers of metal (where they meet at the side seam) and eliminates solder margins so entire container body can be lithographed. Canco is now using this method in side-seam closing millions of tin-plated cans for frozen citrus concentrates.

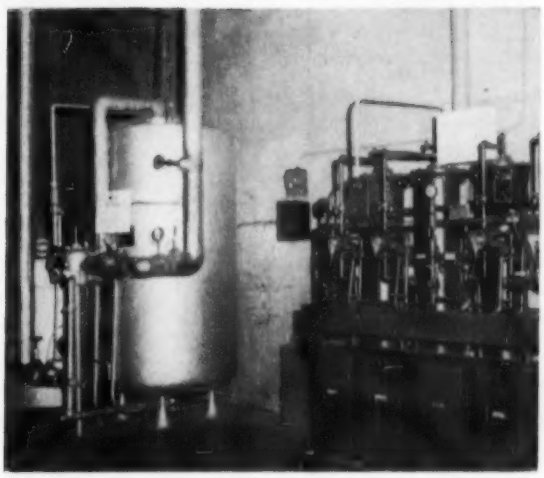
In respect to organic coatings there's need for new coverings for the different metals that might be used. Therefore, principal activities are now pointed toward development of new coatings and enamels from domestic synthetic materials.

Organic tinplate coatings adhere to CTS plate to withstand stresses of can manufacture and distribution. But conventional coatings do not adhere well when CMQ (steel without tin) cans are packed with vegetables, meats, and other low-acid foods that require retorting.

Storage-Test Rooms, Water Units



ALMOST 40,000 cu. ft. of temperature-controlled storage space in this sub-level area is devoted for keeping various test packs at —20 to 135-deg. F. temperatures.



SOFTENER UNIT (left) supplies mineral-free water for processes, boilers, etc. Deionizer (right) is a 4-bed, resin-type unit with 2,500 gph. capacity.

Now, the research trend is toward formulation of coatings that function as effectively on CMQ-surfaces as on tin- and CTS-plate.

Development of process-resistant inside enamels for CMQ cans and outside coatings that resist both processing factors and abrasion in handling may greatly extend application of this material. Now limited principally to the dry and non-aqueous products, CMQ may be extended for many "cans of tomorrow."

Paper Containers

As a major manufacturer of a variety of paperboard and composite containers—including those for milk, salt, frozen foods, ready-to-bake biscuits, and numerous other products—Canco will maintain continuing research in this field.

Currently, many of Canco's research activities concern modification of the company's paper milk containers for non-dairy liquids.

Other studies involve bacteriological investigations; experiments with paraffin, plastic cements, asphalts, adhesives, and laminants; strength evaluations of structural characteristics; tests relative to oxidation and porosity; and checks on other elements possibly affecting quality and high performance of containers.

Hot and Cold Tests

A major concern at Barrington is the improvement of the quality, performance, and shelf-life of containers and canned foods. In the sub-level of the building, hundreds of containers are undergoing accelerated tests in a dozen temperature-controlled hot and cold storage rooms.

Here, almost 40,000 cu. ft. of space is available for storage at temperatures varying from —20 F. to 135 F. (representing Alaskan and humid tropic conditions).

Radiation and Antibiotics

Canco's research center is working closely with other scientists to improve food sterilization techniques. Being weighed are the possibilities of shortening or entirely eliminating, heat sterilization. Included are tests dealing with radiation sterilization and antibiotics.

Studies are progressing on use of radioactive isotopes or ionizing radiation from other sources.

While radiation may prove feasible in the long run, there are many problems, including costs, technical, engineering, and public health aspects.

Gamma rays, being extremely penetrating, would require massive shielding and protective devices in the cannery. Radiation-sterilization of foods might come to compete with improved methods of heat sterilization, such as aseptic canning and high-short processing.

As for the studies on use of antibiotics for food preservation, the Barrington staff observes that the antibiotic, subtilin, has an inhibitory effect, under certain conditions, on specific food-spoilage bacteria.

The center is currently entering intensive research and development study of this subject, and applications may be forthcoming for food preserving.

Canco's overall scientific activity is organized for the diversity and specialization required to meet present and future needs of the firm's 60 manufacturing plants and its customers.

Carrying out this research is a staff of 148 scientists and technicians organized into five specialized teams: Exploratory Research, Materials Research, Container Utilization Research, Container Manufacturing Research, and Development.

Officed in the administration wing of the building are the director of research and his three associate directors, manager of research and four assistant managers, manager of development, and six administrative personnel.

Throughout other areas are the many technical subdivisions for the working scientists.

In the center's below-ground sub-level are housed the utilities. Also in this sub-level are the aforesaid controlled-temperature rooms for experimental can packs.

In the elevated level near the middle of the building is a cafeteria equipped with a built-in public address system. Mobile wall sections suspended from the ceiling make possible flexible use of this area for meetings and conferences. Also in this elevated level is the biochemistry-toxicology room.

Following is a breakdown of personnel and activities in the four research subdivisions and development division:

Exploratory Research—Here, technologists (22) delve in the whole field of science seeking possible applications to Canco operations. In their studies, emphasis is on long-range

possibilities, rather than immediate application, of findings.

Materials Research–Scientists (33) searching out new container-making materials and improvements for existing materials.

Container Utilization Research–Personnel (15) surveying new uses for known types of containers. They also create new types of containers.

Container Manufacturing Research–Specialists (19) concerned with the engineering aspects of container construction and production.

Development – Technicians (22) translating into reality on the production line what "looks good in the test tube."

Typical Facilities and Activities—

Reference Library–A librarian scans incoming periodicals for articles of interest to research, sending a note to specific personnel of the journal and page number. She also reviews manufacturers' literature for new materials and lab equipment. Articles are abstracted and interesting patents listed.

Instrument Room (Exploratory Research) includes these facilities:

An electron microscope (30,000 magnification) is employed to examine the surfaces of steel and tinplate and to study the structure of metals, as well as properties of vapor-deposited metallic films.

Preferred orientation of grain structure in steel (to relate to container corrosion) and tin-coating thicknesses are studied with the aid of an X-ray diffractometer.

An infra-red spectrophotometer is employed to identify and analyze organic coatings.

A recording spectrophotometer distinguishes between more than a million different colors and hues. It is used on lithographic inks.

Thickness of a film is determined with a beta gage employing strontium 90, which decays by beta emission to yttrium 90. Magnitude of beta scattering depends upon the type and thickness of sample.

A Beckman DU spectrophotometer, operating in the visible and ultraviolet range, determines concentrations of substances.

Special Investigation (Exploratory Research)—Studied here is the corrosion resistance of tinplate. As as example, it has been determined that 0.50 lb. tin containers made of good steel have an average life of 114 days in accelerated test packs with prunes—as against a 54-day life in containers made of poor steel.

Studied here, too, are rust inhibitors for can exteriors, possible enamel contamination of foods (by chemical rather than feed tests), and corrosiveness of foods affecting the life of containers.

Spectroscopy—The emission spectrograph is utilized in the rapid analysis of metals and for the determination of minute (trace) elements in foods.

Equipment comprises ARL high-precision power supply, 2 meter-grading spectrograph, film-developing and processing units, densitometer, and calculating board.

Vitamin Assay Room—Canned food samples are analyzed here for vitamin content.

Analytical Lab—Here, researchers are equipped with conventional laboratory facilities—Kjeldahl unit for determining protein through nitrogen measurements, extractors for analzing fats, etc.

Significant in this lab is an apparatus for electrolytically measuring tin and tin-iron alloy layers on steel plate.

Food Chemistry Lab—Work is carried out on unexpected customer food problems. Researches now deal with the flavor of canned frozen citrus juices and sections, also flavor changes of single-strength orange juice.

Food Packaging—Test packs are put up and then periodically examined under varying storage conditions. Cans are checked for corrosion and adhesion of enamel to tinplate. Much work is underway on developing improved enamels for carbonated beverages. Put up are newer types of foods heretofore not canned.

Bacteriology Lab—Equipment consists of three walk-in type incubators (one at 98 deg. F., one varying from 40 to 100 F., and the last at 90 F. and 85% R.H. for the paper-lab. group); two special culture rooms; flash evaporator for concentration of antibiotics, citrus juices, sugar solution, or any heat-labile materials; thermal resistometer for determining thermal death rate of bacterial spores; hot-air glassware sterilizer; and a 50,-000-rpm. steam-turbine super centrifuge for separating bacterial spores.

Metal-Bonding Cements and Plastic Films—Researches are conducted on side-seam cements. Here, a device is employed to evaluate tensile strength of cements and peeling off of plastic films from steel and tin-plate surface.

Fiber Container Lab—Facilities comprise conventional TAPPI-type paper testing equipment, like Mullen, stiffness, tear, and porosity testers. Further, there is a basis-weight scale. Also, there is abuse-testing equipment simulating dairy handling of milk cartons.

Work is continually going on in search of better carton coatings.

Rubber Technology Lab—Sought here are improved rubber sealing compounds for use between end and body and for double seams of cans. New types of resins and polymers are being eyed to improve compound sealability under high speed can-making operations, and withstand rougher handling due to automatic filling and casing machines.

Organic Coating Lab—Preliminary studies are being conducted toward developing better can linings.

Mechanical and Engineering Lab—Researches on continuous welding and ways to make cans more rigid.

Significant here is a Brush surface analyzer for correlating plate smoothness and organic coating coverage, as well as plate smoothness and rust resistance.

Unit consists of a diamond stylus to scan surfaces of paper, tinplate, or chemically-treated steel. Motor-driven, this stylus flexes a piezoelectric crystal that generates current that is then amplified and recorded.

Employed, too, is an optical comparator to magnify structural details of containers.

Metallurgical Lab—Studied with the aid of microscopes (magnification from 2 to 3,000) are grain structure of plates, relation of carbides to corrosion, adhesion of tin to steelplate, and various coating metals, such as aluminum, nickel, cobalt, and titanium.

Experimental Canning Lab—Employs conventional equipment for preparation and canning of foods. Also uses automatic and semi-automatic machines for filling, closing, and crimping fiber milk containers.

Materials Research Lab—Equipment consists of tensile strength, impact, flip, and Rockwell testers.

Production Techniques Lab—A creep tester evaluates the strength of soldered can seams.

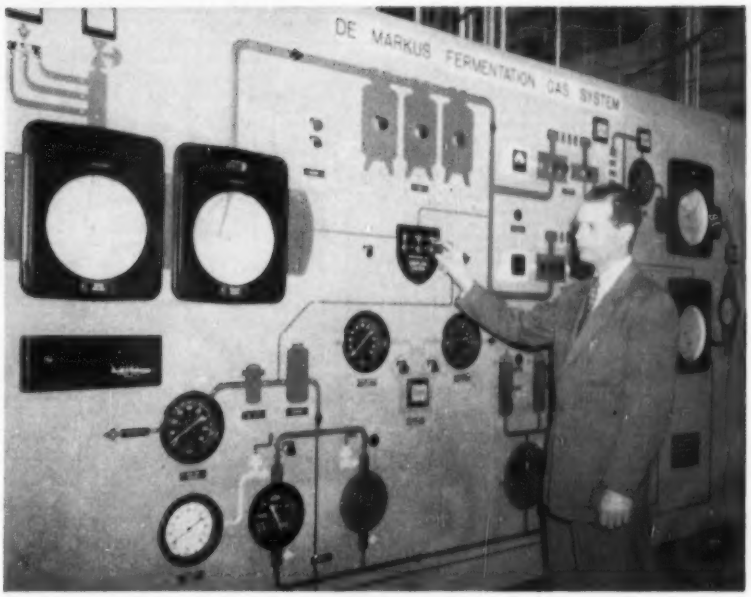
Tester, for example, showed bursting of a welded side-seam beer can at a pressure of 400 lb. at 250 F.; of a soldered, tab side-seam carbonated beverage can at 270 lb.; and of a soldered Groenke side-seam beer can at 140 lb.

Sealing Compound Experimental Lab—3-lb. batches of rubber sealing compounds are prepared for test purposes in a Banbury mixer. A 2-roll mill puts out sheets of the compound of any thickness. Sheet is cut up into pieces to be dissolved in an organic solvent, or water-dispersed in a Baker-Perkins mixer.

The compounds are then evaluated for sealability on experimental lines.

Organic Coating Application Lab—New coatings are applied to tinplate by roller, spray, and induction-heating techniques.

Efficient installation recovers sufficient high-purity carbon dioxide to safeguard beer quality throughout operation . . . Highlight of new system is compact, convenient, graphic-control panel



AT THIS compact, attractive-looking graphic-control board, operator can easily follow entire operations of DeMarkus CO_2 purifying system. Blatz Engineer I. C. Plouff points to triple-tap testing device.

Centralized Instrumentation

Plus Purification Makes . . .

MORE AND BETTER CO_2

CHARLES J. KRUECK, R. G. TESSMER and JOHN V. ZIEMBA

Respectively, Supervising Engineer, Blatz Brewing Co., Milwaukee, Vice-President in charge of Engineering, Louis De Markus Corp., Buffalo, Associate Editor, "Food Engineering"

An advanced instrument-controlled system—first of its kind in the brewery field—is efficiently collecting CO_2 from fermenters at Blatz Brewing Co., then purifying it in cost-cutting fashion for subsequent process-and-quality safeguarding.

Of course, purifying process-recovered CO_2, to carbonate beer and give it is characteristic zest and sparkle, is not new. Neither is counterpressuring of the tanks being filled in storage, finishing, and government cellars.

What is new is the recently installed centralized graphic-control panel, which is designed for compactness and operator convenience.

This is the Blatz "pushbutton" approach to more accurate control in purifying CO_2 for making quality beers that are consistently more uniform.

Located in the engine room, this 7 ft. x 12 ft. panel unit monitors the entire CO_2 system,* and permits remote control of all key equipment. Generous use of color-keyed pilot lights, alarm signals, gages and recording controllers continuously informs the operator of conditions throughout the plant.

Two primary goals are accomplished by full remote instrumentation: First, various managerial and department heads including brewmaster, production superintendent, bottling department superintendent, chief engineer, etc. can appraise the current plant loads as well as the reserve storage situation of this critical component at the panel instead of checking at many individual points.

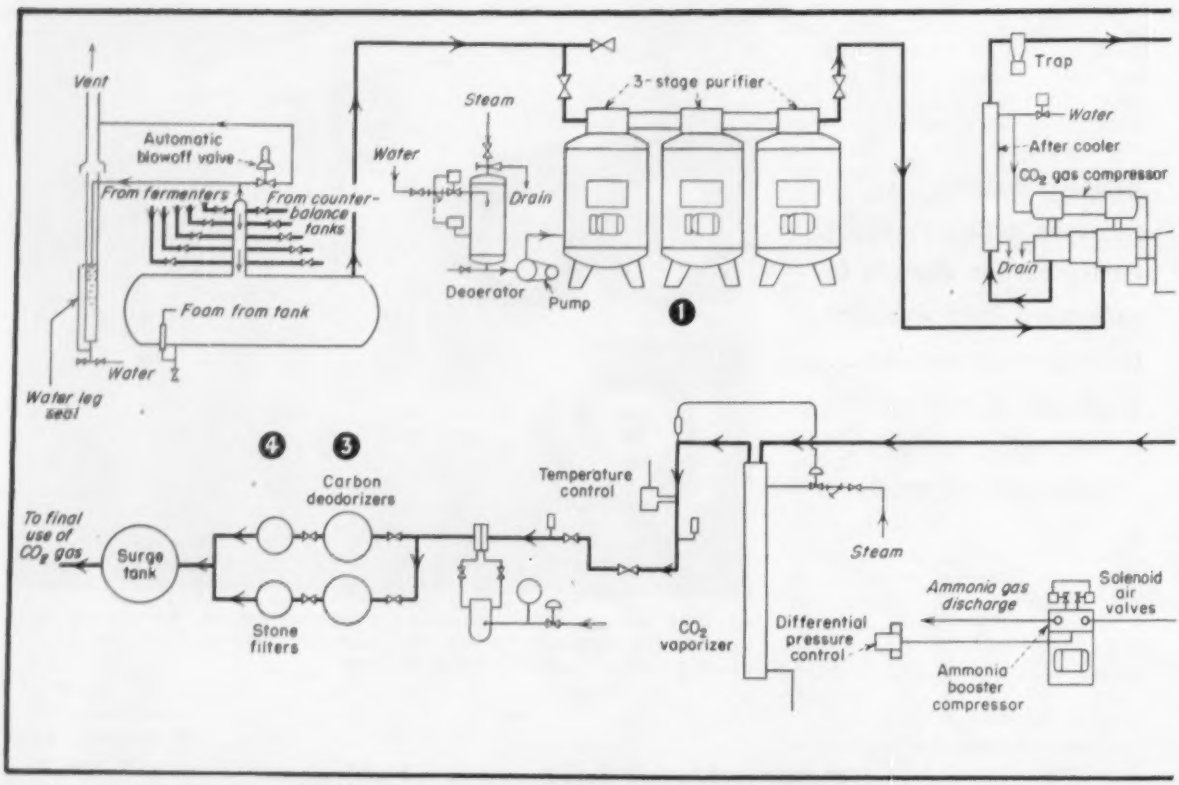
Secondly, all control and responsibility for system operation now centers in the engineering department, avoiding the overlapping and confusion that could result when some mechanical components are necessarily installed in other departments.

Illustrated on the panel is a schematic diagram of the entire CO_2 system, with recorders, gages and lights built in to clearly differentiate between them. Engraved plastic nameplates describe individual components for the benefit of those not familiar with the system.

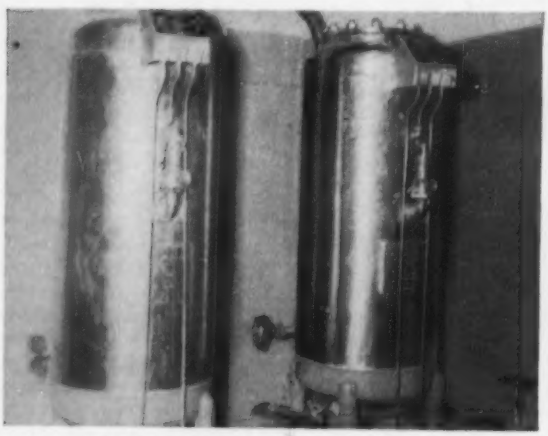
All critical components can be controlled from the diagram on the board. Auxiliary valves and minor accessories are eliminated from the diagram to prevent unnecessary confusion. And ease of operation is further achieved through skilful use of colors on the control panel.

Remote pneumatic transmitters send pressures, temperatures and other process variables over long distances to the control board. Control cir-

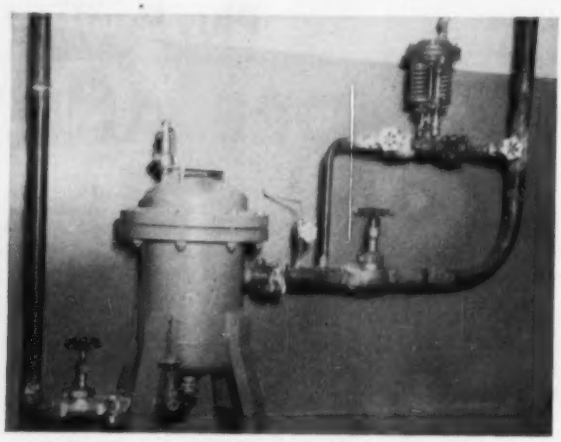
*Basically, the system was designed by Author Tessmer in cooperation with Author Krueck and his staff. The De Markus Corp. subsequently manufactured and installed the complete system.



BLATZ in-plant set-up shows highly efficient recovery and purification of carbon dioxide from fermenters and storage



1 **IN 3-STAGE PURIFIER,** impurities are removed from CO_2. Deaerator takes out oxygen.



2 **COOLER-DRYERS** serve as "safeties" by collecting water carried from moisture-trap tanks.

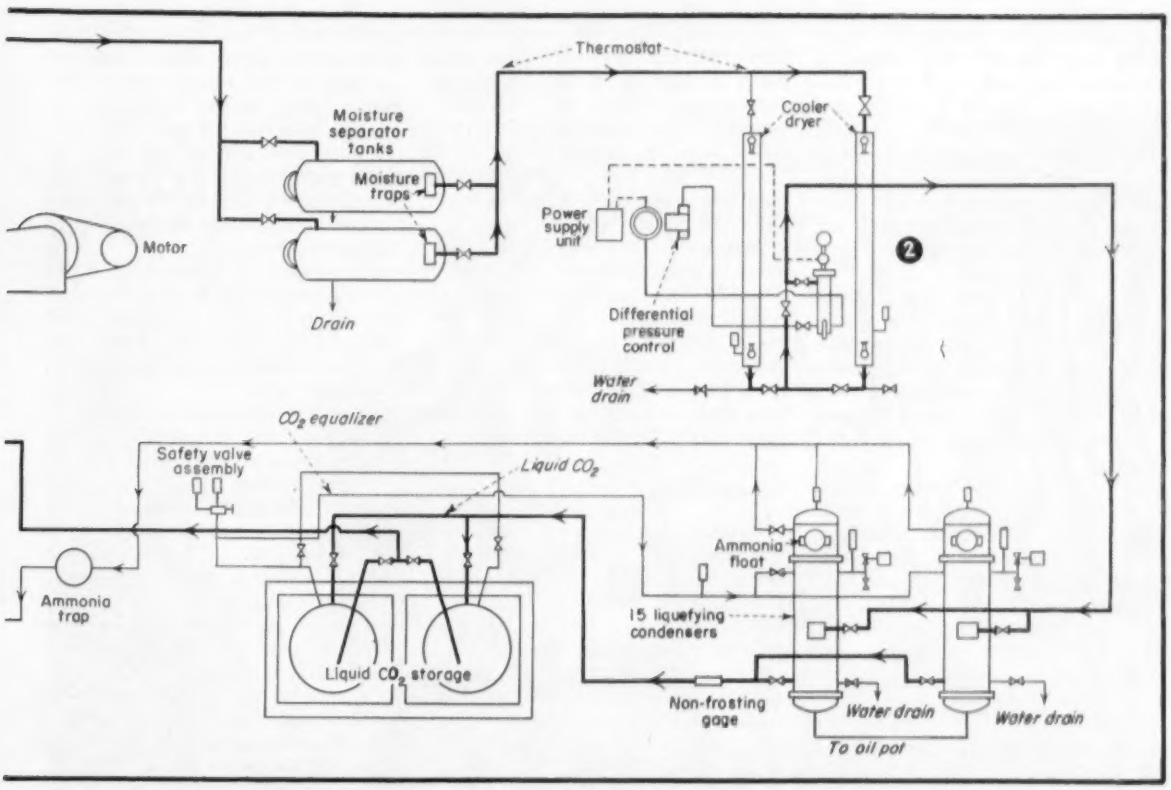
cuits to valves and other remote units are for the most part electrically operated. Required for these safe, dependable and economical systems are over 10,000 ft. of control wiring and 3,000 ft. of piping.

Problem of recovering enough CO_2 to carbonate beer and also to protect against air pick-up by means of a CO_2 "blanket" grew really worrisome at Blatz until the present system was set up. Formerly, as much as $60,000 worth of gas had to be purchased annually from outside sources and then purified. But today, enough is recovered to fill current needs.

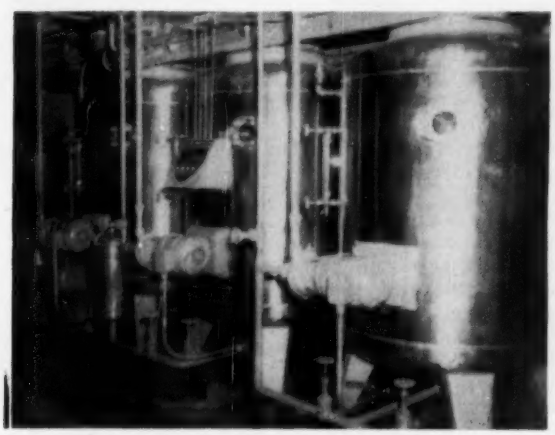
What's more, plans are now under way to expand present CO_2 facilities. Original panel design provided for this expansion by the use of double components and even additional graphic elements. Too, concrete foundations have been poured for additional compressors, condensers and vaporizer.

Total cost of the new system will run about $100,000. However, savings in expense and operation, compared with the former system, are expected to pay for the new installation within two years.

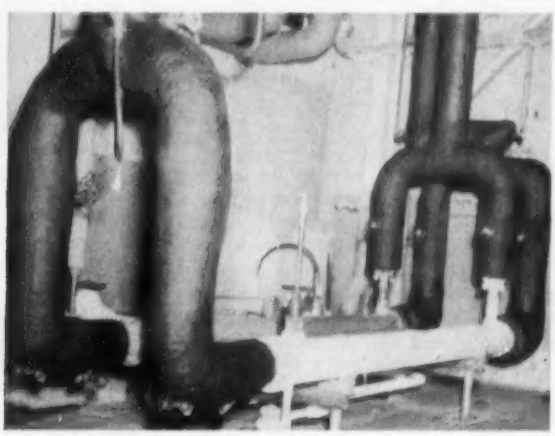
As for recovering more CO_2, it has been achieved by: (1) Increasing the capacity of the system to collect and better purify the gas; (2) collecting the gas at all stages of fermentation, and (3) recovering, rather than venting off, all of the gas from counter-pressure tanks.



tanks. Contributing to stability and taste, CO_2 is an indispensable beer component. (Numbers key to photos below.)



3 **FURTHER GUARDS** are these activated carbon units for removing pick-up impurities.



4 **ANOTHER** "safety" is this porous-stone filter that assures final gas purity.

Limitation of the former handling system was recovery of only the relatively purer gas during peak stages of fermentation. In the early and final stages, the gas containing a high percentage of undesirable air and odors, had to be vented off. The present system is sufficiently large and efficient to handle all gas from fermenters and from counterpressure tanks.

CO_2 gas used in beer processing really mounts up. And it's for that reason that the present highly efficient system was put into operation. For example, to carbonate 1 bbl. of beer about 1 lb. of gas is utilized. And a little over 1 lb. per bbl. is required to provide counterpressure every time the beer is transferred from one tank to another.

Purpose of purifying is to remove odors of highly aromatic organic compounds carried in trace amounts by fermentation gas and thus to avoid subsequent taste variations in beer carbonated or processed with gas of uncontrolled composition. Consequently, 100% of the raw fermentation gas at this brewery is purified, then liquefied so that only CO_2 free from moisture and air is used in the final product.

Purifying Technique

First step in the system is collecting the gas in a horizontal foam-trap and pressure-equalizing tank (5½x24 ft.). Capacity is 3,500 lb. per hr.

Automatically checked by a Beckman analyzer is the amount of oxygen in the foam tank. This content is instrument-recorded on the graphic-control panel. Should the oxygen exceed a pre-set point, a buzzer sounds and a light flashes on the control board. Operator then stops the system to take corrective measures. Pressure is also instrument recorded and controlled on the board. Setting is for 2 psi. in this tank.

Fermentation gas now passes through a 3-stage purifier. In succession, it flows through an effective water wash, potassium permanganate oxidizing solution, and final water wash. Each 3 x 7 ft. purifying tank provides multiple steps of gas-liquid contact.

Initial contact is by means of dual dense conical water sprays where finely divided water particles are intimately mixed with the incoming gas. Next, the gas flow is divided into fine bubbles with great surface area that rise through a second water bath for additional contact. In this manner it is impossible for channeling or bypassing of its purifying agent to occur.

Hooked to the first purifier is a continuous deaerator (16 in. x 4 ft.). Operating under a steam pressure of 100 psi. and a 15 in. vacuum, it supplies 5 gal. per min. of oxygen-free, 88-F. water to spray-remove oxygen and other water-soluble foreign substances from the CO_2.

The first water stage removes most alcohols, esters, ethers, aldehydes and ketones. Continuous make-up water carries these impurities to a sewer. The oxidizing stage reacts with remaining organics, mercaptans, hop resins, and sulphur gases and precipitates them out as a manganese sludge. Final water stage serves to pick up any permanganate entrained in the gas from the previous stage and also to provide additional cleansing in the event of overloading of earlier stages.

The gas, now under a pressure of 1¼ psi., is compressed to 250 psi. in a 2-stage, water-cooled compressor. To protect the unit a "no-water" alarm is provided in conjunction with the jacket and aftercooler feed. When water pressure drops a buzzer sounds and the proper indicating light on the panel diagram flashes.

By pressing a "reset" button the operator can shut off the audible alarm and the light will stop flashing, but will remain on steady to indicate the continuing condition. When pressure returns to normal this light will automatically go out. Meantime electrical interconnections have stopped the compressor to prevent equipment damage.

Panel control for this 75-hp. compressor includes a base load starting switch and a running time meter. Actual output of the compressor is fully controlled from a Foxboro pneumatic sequence unit that operates in conjunction with the suction-pressure recorder. This unit can control two compressors to provide 0%, 50%, 100%, 150% and 200% operating points in accordance with the availability of gas at the foam trap.

Actual operating step at any moment is fully automatic but is indicated to the operator by means of colored pilot lights. This special control is necessary to provide accurate operation without hunting, even though the total suction pressure variation that is supplying the feedback signal may only be 7 in. of water.

Dehumidifying the Gas

Gas discharged from the compressor now flows to two moisture-separating tanks (3½ x 30 ft.). In the cellar flow of gas to these tanks is recorded and indicated in lb.-per-hr. and total lb. by an integrating flowmeter.

As a safety precaution, a gage is spotted on the panel to indicate pressure of gas discharged from compressor. Further, it shuts off at a pre-set high pressure, and automatically sounds the main buzzer alarm.

The heavy humidity load of the hot compressed gas is taken by condensation in dual tanks. These tanks are installed in one of the beer storage cellars to take advantage of the uniform 36 F. ambient at that point. Reduced gas velocity in the tanks permits condensed fogs to settle and a knitted Monel moisture trap prevents the residual droplets from carrying over.

Final dehumidification to a 0 dewpoint is achieved in horizontal cooler-dryers that utilize liquid CO_2 as refrigerant. A 6-point multi-record dynalog with a sensitive Dewcel continuously records the dewpoint as well as five other temperatures throughout the system on a single 24-hr. chart. Each temperature is printed in a different color line and each color corresponds to the colored control circuit shown on the graphic diagram.

To signal the need for defrosting of the cooler-dryer a differential pressure control automatically follows the pressure drop across it. When frost builds up to a pre-set value the flow is obstructed sufficiently to cause a drop in excess of the set value and the alarm sounds.

Liquefying, the Next Step

Now completely free of moisture, the gas enters two vertical flooded ammonia-controlled condensers (16 in. dia. by 6 ft.) where it is converted to a liquid. A unique frost-free sight glass at this point allows visual inspection of the liquid flow to two 40-ton storage tanks. Panel gages indicate, by means of an easy-to-read rising red line, the level of liquid in the storage tanks. As a liquid, 30 times as much CO_2 may be stored in a vessel than would be possible in the gaseous form.

Since oxygen is insoluble in liquid CO_2 it remains with other noncondensable gases in the headspace of the tank and the condenser. From here it is periodically purged by means of a solenoid valve.

The CO_2 condensers are cooled by liquid ammonia pumped from the storage tanks of the plant system. A 50 hp. Carrier booster compressor draws off the ammonia vapor in the cooling process and discharges it to suction lines of the brewery system for recompression and liquefaction.

Before the CO_2 can be used for carbonation and counterpressure purposes, it must be converted from liquid back to a gaseous state. This is accomplished by running it, at 3,000 lb.-per-hr., through a vertical type steam vaporizer—a shell-and-tube exchanger that heats the liquid to its vaporizing point. Operating steam pressure of 15 psi. is indicated on a control board gage.

Precautions Aplenty

Final, purity is assured by sending the gas through activated carbon deodorizers and porous stone filters. The two carbon deodorizers (16 x 36 in.) operate in series, and each has two activated carbon compartments.

These indispensable secondary purifiers remove all traces of odors likely to pass into the system through accident or neglect. The first carbon compartment accomplishes practically all of the deodorizing, while the second serves as a safety. In each compartment, the gas passes through a layer of activated carbon contained within an easily removable and refillable concentric canister.

These units are equipped with the unique DeMarkus triple-tap deodorization-testing device. Since the human nose is equipped to differentiate between odors but not to remember them, advantage must be taken of this fact. If the final impurities are removed in the first of the two compartments a definite odor may be detected between the test tap on the inlet gas and the test tap at the interstage point. No odor difference can be noticed between the interstage and the outlet points.

When the first stage becomes

(*Turn to page 174*)

Named tops in civic activity and service among Green Giant workers is Claude C. Barnard (center), Martinsburg, Pa., field superintendent. Here, he receives desk pen award from Plant Manager M. V. Bankert. He also got extra week's vacation with pay. Witnessing presentation (left) is Office Manager R. Hartman.

"Employee of Year" ⬆

—Award Plan That Pays Big

Honor program launched by Green Giant Co. is chalking up gains for all—community, workers and company . . . Benefits spread over fields of public and personal relations

FE STAFF

It is the belief of Green Giant Co., Le Sueur, Minn., that an organization becomes best known *through its employees.*

Also that it is just as important for these individuals to be *good citizens* as to be good employees.

These convictions prompted announcement in the Oct. 1953 *Nibletter,* the company house organ, of a special award to the "Employee of the Year".

The plan called for choosing workers in each of the company divisions, according to the gage of outstanding civic activity and service to the community. Then, from the exceptional half-dozen named, the judges were to select one for top honors as "Employee of the Year".

In addition to public recognition for community service in 1953, engraved desk-type pen sets were presented to division winners. And the one judged "Employee of the Year" received an extra week of vacation with pay as an extra bonus.

This special recognition for high civic accomplishment

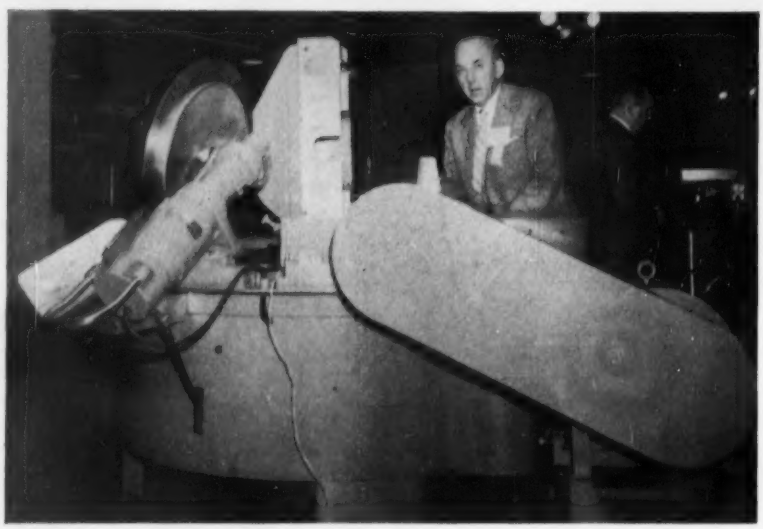
(*Turn to page 197*)

FE Camera Catches Unit-Operation Aids

—At National Independent Meat Packers show held recently in Chicago

On This Page: 3 CUTTERS

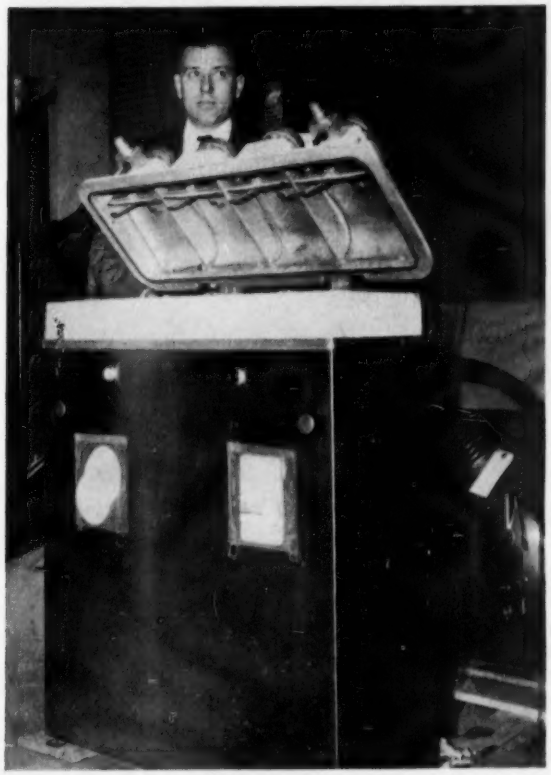
30,000-LB.-PER-HR. is super-capacity of grinder (left) for fresh and frozen meats. It handles a 100-lb. block of partially frozen meat through a ⅛-in. plate. Has large hopper throat and revolutionary beveled-edge screw design (36-in. screw). Engineered for easy cleaning and sanitary operation. Displayer: Speco, Inc., Schiller Park, Ill. (70A)



"DIRECT CUTTING" converter eliminates grinding. Features reversible, double-edged positive-locking knives; interlocking safety switch; centralized control panel; safely accessible knives; automatic adjustable bowl scraper; removable bowl guard; and special knife-adjusting collars.—John E. Smith's Sons Co., Buffalo. (70B)

GERMAN-MADE chop-mixer with two speeds works equally well for dry and other type sausage, its special stainless knives reducing smearing and heating. Counter on this 640-lb. batch unit shows number of revolutions of mixing bowl as aid in insuring batch consistency.—K. C. Seelbach Co., Inc., N. Y. C. (70C)

Here Are Shown: 3 PACKAGING UNITS • PLASTIC TRUCK • MAN LIFT

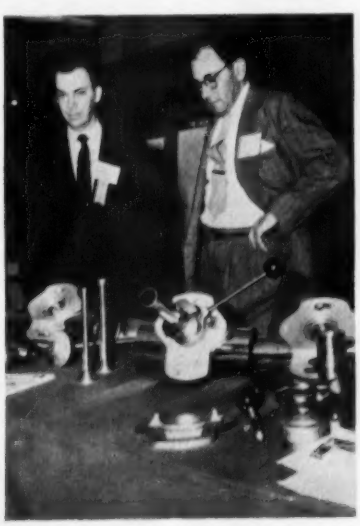


4-HEAD VACUUM-SEALING machine is built to handle flat or chunk-style items at same time. System works with two machines operated alternately by one girl.—R. S. Randall & Co., San Francisco. (71A)

2,100-PER-HR. HAMBURGER patty machine can be altered with special forms (held by displayer) to make mock chicken legs and boneless pork or veal chops. Also turns out other patties.—Hollymatic Corp., Chicago (71B)

LASTIGLAS ON YOUR EQUIPMENT
• Eliminates Periodic Galvanizing
• Cuts Cleaning Costs to Minimum
• Wirebrushing Eliminated
• No Oiling Required
• More Corrosion Resistant
• Life Expectancy... 5 to 10 Years

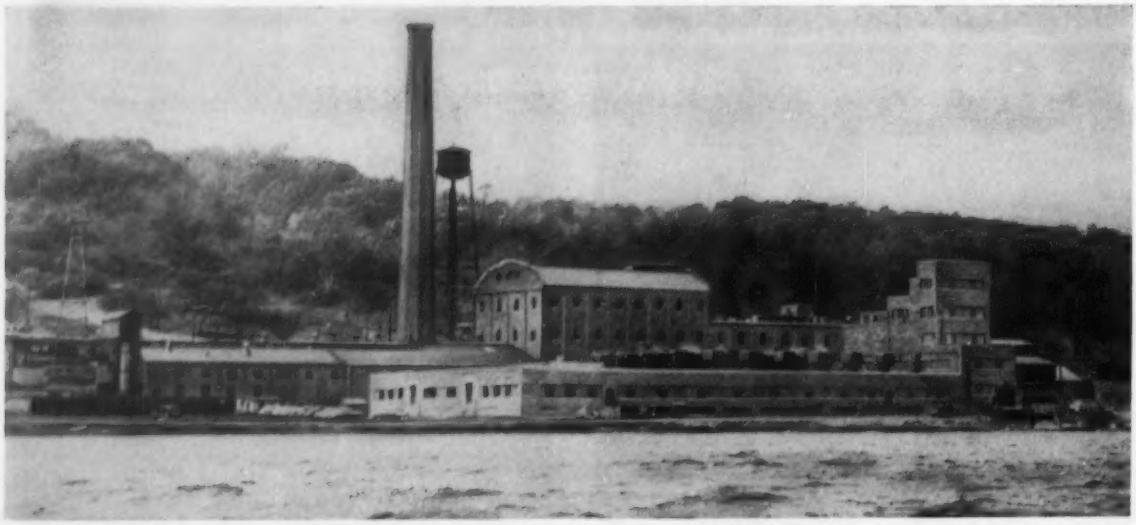
PLASTIC TRUCK made of thermosetting Epon-base coating sprayed in multiple coats over sandblasted surface. Called "Lastiglas," material can be used for tanks, tables, conveyors, etc.—Bishopric Products Co., Cincinnati. (71C)



EXACT-WEIGHT proportioning unit can be attached to all standard stuffing machines. Well-constructed filler meters the meat into casings in weights ranging from 1 to 20 oz. Displayer was Margolia Importing Co., New York (71D)

MAN-LIFT PLATFORM simplifies splitting, washing, and shrouding of cattle. Air-operated unit eliminates climbing and worker fatigue. Adjustable timing cycle assures fixed-rate output. — Carpenter-Hetzler Co., Los Angeles. (71E)

For More Information: On Reader Service Coupon Inside Back Cover, Circle Key Numbers Given at Ends of Captions on These Pages



PLANT is built on shore of Seneca Lake—directly over 100-ft. vein of rock salt. For processing, derricks (each end of plant) tap brine-collecting wells. Many other such wells line shore north of plant.

Gets *Maximum* Processing Heat From Every Pound of Steam

Salt maker throttles costs with new, more efficient evaporating equipment and higher steam pressure.

FE STAFF

Improvements in equipment design and operating procedures, specially accenting more efficient use of heat, are chalking up new progress at International Salt Co.'s Glen Works, Watkins Glen, N. Y.

Most important of these advances are:

1. Production of steam at high pressure in modern stoker-fed boilers.

2. Operation of all motors and other equipment with plant-generated power.

3. Installation of a new multiple-effect Monel-metal evaporator designed for top efficiency, and

4. Dual use of heat in all drying processes.

The plant produces a wide variety of salt products. It is located on the western shore of Seneca Lake, where it is assured of an unlimited supply of pure, cold water for processing purposes.

Water from this lake is also used to convert rock salt to brine in the 100-ft. vein lying some 1,770 ft. below the plant.

Brine thus produced is pumped to the plant and converted to salt in one of two standard processes—grainer for coarse, vacuum for granulated.

Generates Own Power

The efficiency program begins in the boiler room, where two coal-fired boilers produce 110,000 lb./hr. of high-pressure (250 psi.) steam. This goes to three turbo-generators—2,450 kw. capacity—and then it is exhausted at 12 psi.

This exhaust steam then goes to processing, where it furnishes heat for production of salt crystals.

In this way, adequate power for all operations is generated at minimum cost with steam produced primarily for processing.

Salt-Making Processes

Of the two methods employed at the Glen Works, the grainer process, in which brine is held in open pans at a temperature of 185 deg. F. until salt crystals form, was noted as offering little opportunity for increased efficiency.

Grainers must operate single effect, since they rely on evaporation of water from quiescent brine at atmospheric pressure to produce the desired coarse crystals. Loss of vapors to the atmosphere prevents recovery and use of heat from them. And buildup of calcium sulfate on the steam coils reduces heat transmission.

However, the evaporators used in the vacuum process can be made more efficient in a number of ways. Multiple effects greatly increase the amount of water that can be evaporated per pound of steam. And external heaters, in which brine is circulated at high speed through small diameter tubes, improve heat transfer and allow reduction in size of evaporator bodies.

Both of these advantages have been realized in the new Glen Works evaporator (made by Swenson Evaporator Co., Harvey, Ill.). The new unit comprises four effects (quadruple), each 65 ft. high. Two of the effects are 14 ft. in dia., the other two 15 ft.

Each effect has its own external heater containing 1,053 copper-nickel tubes 26 ft. long by 1¼ in. o.d. First-

effect heater uses low pressure steam discharged from the turbo-generators. Condensate from here is returned to boiler feedwater heater. The other three use vapors given off from the boiling brine in the preceding evaporator bodies.

Efficiency of the evaporator was further increased by application of insulation to prevent heat losses. Used was 2-in.-thick blocks of Foamglas (Pittsburgh-Corning Corp.) covered with asbestos cement and enclosed in canvas to make a permanent job.

Purifying the Salt

Each effect of the new evaporator has a cone-shaped bottom prolonged in a straight tube (elutriation leg) used to wash salt crystals before they are removed. As water evaporates from the brine in the unit's body, crystals of salt are formed and settle in the leg. Part of the incoming brine is introduced through this leg and, as it moves up to the evaporator body, washes soluble impurities and fine crystals of calcium sulfate from the salt.

YOU'LL FIND a graphic detailed, Foldout Flowsheet of International's efficient operation on pages 102-105.

Result is that salt leaving the unit as a slurry is suspended in brine of greater purity than that in which it is formed.

Slurries from the four effects are combined, then washed in fresh brine, pumped to two top-feed Oliver filters, where remaining brine is removed, and dried. By this method of purifying, a product exceeding 99.5% NaCl is made.

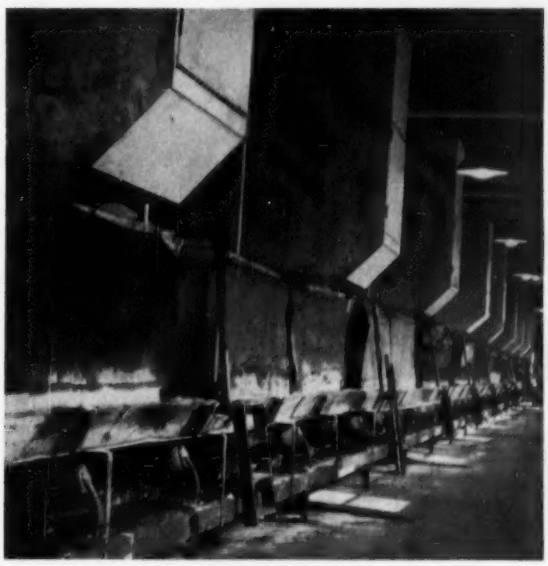
Dried salt is screened to the exact sizes required for different grades. These range from the smallest size, known as flour salt and used in self-rising preparations, to the largest, which is sold as industrial salt.

In the grainer process, salt is continuously removed by reciprocating rakes from the large pans in which it is formed. Discharge is to a conveyor belt that, in turn, feeds an escalator that empties the salt into a wash tank. From here, slurry goes to two top-feed Oliver filters, which separate the brine from salt crystals. Former is returned to settling tank that supplies brine to grainer pans. Latter is partly dried by hot air. Then that which is to be packaged is further dried in a trump dryer. Spent air from latter goes to the filters.

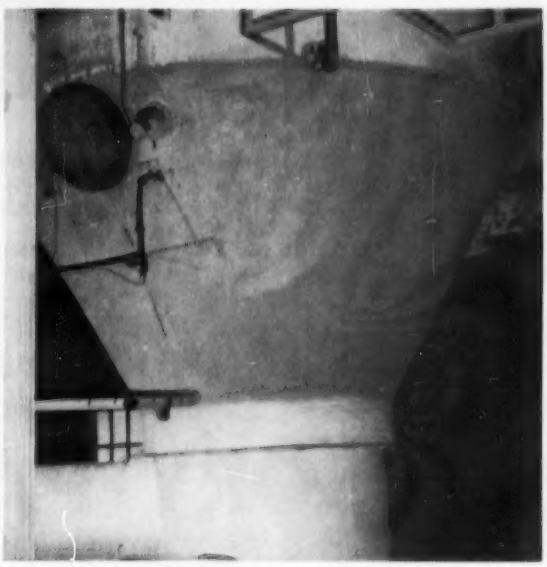
The trump dryer comprises a metal

(*Turn to page 174*)

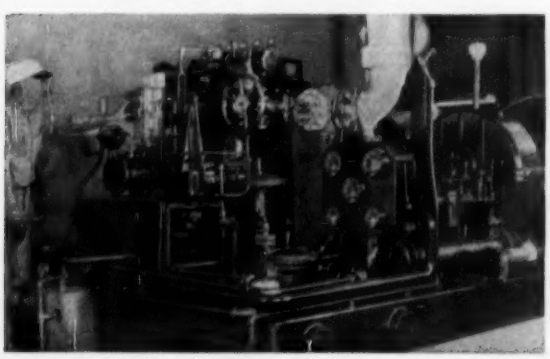
Processing, Generating, Packaging Equipment



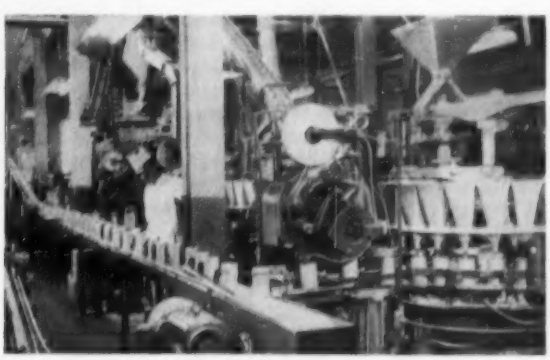
GRAINER pans produce coarse salt by slow evaporation from quiescent brine. Discharge is to belt conveyor (above). Vapors rise via ducts (top) to roof.



NEW EVAPORATORS, of Monel metal, and large vapor lines are heavily insulated to cut down heat losses. Quadruple-effect external heaters also boost efficiency.

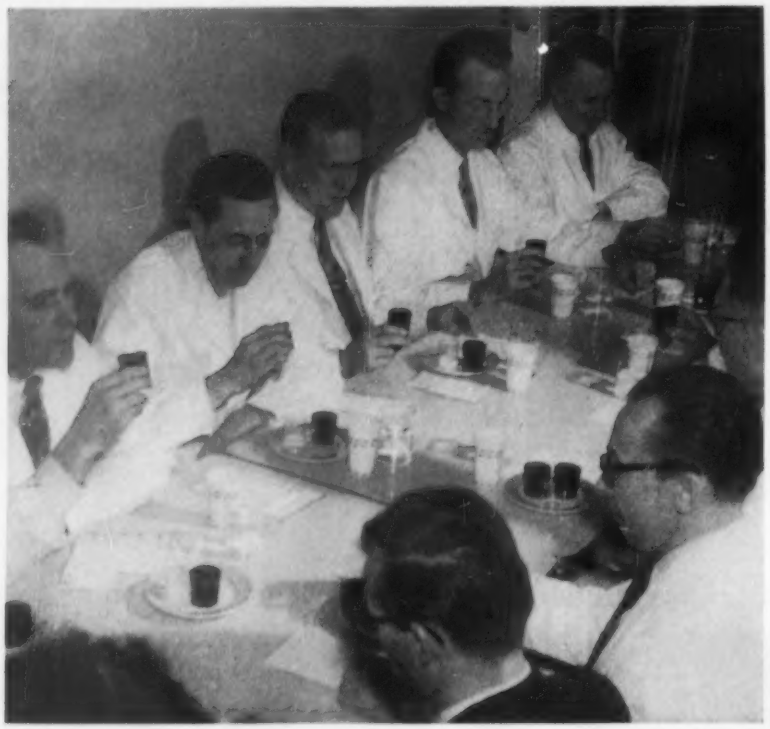


TURBO-GENERATOR (1,250-kw. capacity) is one of three that use high-pressure steam to produce power.



PACKAGING LINES for 26-oz. round containers. Cans are unscrambled on floor above. Bins feed salt.

A SPECIAL FE ENGINEERING REPORT



AN "OPEN" APPRAISAL?

Which Way Is Right

It's vital to choose the correct procedure and follow it to the letter—not only in this salient step but also in every detail before and after sampling—if you're seeking . . .

Truest Evaluations in SENSORY PANEL TESTING

JACK K. KRUM

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How—*exactly*—does it look . . . taste . . . smell . . .feel?

This is the question continually challenging food manufacturers, researchers, and technologists when they seek dependable appraisals of their products.

Searching for the answer, some rely entirely on their own judgments. Others collect unrelated opinions of a few. Still others use formal panels, but unknowingly are lax in applying proper methods.

Too few have employed the latest sensory testing panel techniques. And—just what are these techniques?

For clarification, note the six distinct steps required—

I. Selecting Panel Members
II. Determining Size of Test Panel
III. Training Panel Members
IV. Choosing the Tests (Types and Uses)
V. Drafting Procedures and Conditions
VI. Analyzing and Interpreting Results

And now to a discussion of these steps, with particular attention to setup and operation:

I—Selecting Panel Members

The individuals chosen should have a *fair ability* to distinguish between appreciable differing levels of the property or properties to be evaluated and, probably more important, should be *interested* in sensory judgments.

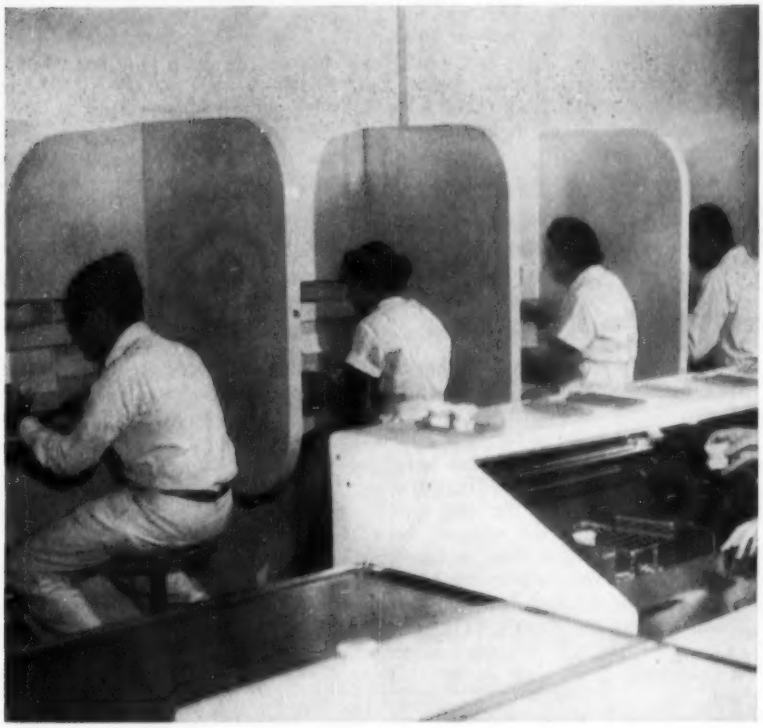
But just how do we go about selecting such individuals?

Initial move might be a questionnaire to be filled out by all possible candidates. Here, there should be covered such items as: (a) experience, (b) availability, (c) age, (d) sex, (e) health, (f) smoking habits, (g) quantity of the particular goods habitually consumed, and (h) prejudices.

Now let us consider the above points individually:

Experience. It is felt that a person with previous experi-

OR "PARTITIONED" CHECK?



For *Your* Product?

ence might disseminate some of his skill. And since he has some knowledge of judging techniques, he may note or detect differences that are unheeded by the inexperience judge. He can often describe his taste impressions better and may have a better understanding of terminology used.

Availability. Panel members must be reasonably accessible. It might be desirable, or necessary, to establish a company policy making individuals available for participation in panel judgments.

Age. It is believed that sensory ability decreases with age, and that preferences change also. Therefore, it is felt that panel members should be between the ages of 20 and 50. Limiting factors are experience in younger people, ability in the older group.

Sex. Taste and odor discriminations are not sex-linked nor sex-influenced. Therefore both sexes may be used.

Health. Panel members should be in good health, and not fatigued or worried. They should not be overly susceptible to mouth and sinus infections nor have numerous headcolds. Persons should be eliminated who are allergic to materials to be tested.

Smoking Habits. There is no definite proof that smoking dulls the senses of odor and taste, but it may be helpful to know the judge's smoking habits.

Quantity of Product Habitually Consumed. This is an indirect way of asking how well the individual likes a particular product. This applies to prejudices also.

Prejudices. For convenience and more accurate judging, eliminate all who do not like, or refuse to test a particular product.

Four Primary Tastes

After examining the questionnaires and making selections, the next step is to test the resulting group for sensitivity to the four primary tastes—salt, sour, bitter, and sweet. This is done with chemically pure solutions of sodium chloride, lactic acid, caffeine, and sucrose.

Solutions should be made up in a series with each twice the strength of the preceding one. Minimum strength solution for each substance should be 0.00005M (molarity, see Table I). Tasting should be in order of increasing strength.

Each judge should be told that he is being tested for sensitivity of taste to salt, sweet, sour, and bitter. But he should not be given a clue as to the order in which the substances are offered (see "Score Card for Primary Tastes").

If facilities are not available for measuring or weighing the amounts of compounds as given in Table I, the method shown in Table II may be used. This will not result in the same concentrations, but the solutions will be satisfactory for determining relative ability of each individual tested.

From results of these tests, those who are taste blind for any particular primary tastes are eliminated. Then, the average threshold for each taster is determined and, if there are sufficient candidates, those with extremely high threshold values are eliminated, followed by those with extremely low thresholds.

Ability to Discriminate

The third step comprises testing each individual to establish his discriminatory power. There are several ways. Most widely used is the triangle test, in which three coded samples are presented—two alike and one different—and the judge is required to identify the different one.

Samples should represent types of flavor variations in the product or products concerned and, if possible, present a series of graded difficulty. Degree of difficulty or amount of flavor difference for each test should be such that the number of correct judgments is significantly above the chance level (33⅓%), but not so easy that more than 80% of the judgments are correct.

Tests should be continued until candidates can be ranked on percentage of correct judgments.

It is important to have each take about the same number of tests, otherwise the relative opinion of a judge as compared to the rest of the group may be in error.

Then determine the cutoff points between those accepted and those rejected. This is done by considering: (a) Number of panel members required, (b) precision indicated by nature of problem, and (c) significance level of the differences between individual scores and the chance score of 33⅓%.[3]

If the panel is to be used for estimating quality, or for types of tests where subjective impressions are to be rated, members should be tested in situations involving repetition of quality judgments on series of samples which represent a considerable range either in total quality or some sensory property.

Here, it is pertinent to know how well members reproduce their ratings and how sharply they discriminate between samples of a series.

Achievement may be evaluated by analyzing data for each judge, using the statistical technique of analysis of variance. Assumption here is that, if a judge discriminates between samples, and at the same time is consistent in his repeated judgments, the variance between samples will be considerably larger than within samples. The ratio between these variances is known as "F-ratio".

To select panel members, rank the order of judges according to their F-ratio. Those with F-ratios higher than required for the 5% level of confidence are chosen for the panel.[3]

II—Determining Size of Test Panel

For routine investigations and difference testing, a panel of 10 to 30 persons will suffice. Naturally, the larger the panel, the more reliable the results, assuming a given degree of competence for each member.

Little statistical significance can be attached to results when fewer than 10 judges are employed. If, however, only 3 or 4 are available, it is possible to repeat the tests enough times to give a suitable number of results.[3]

III—Training Panel Members

Members should be trained on the products to be tested, and the system of evaluation should be nearly the same as that used in the actual test. Interest is often stimulated by having judges participate in setting of the scoring method and system of evaluation.

It is desirable to have samples to illustrate various flavor components and degrees of each component. A person can be trained to judge flavor by first examining samples in which a single flavor predominates. He then should recognize and estimate the intensity of his sensory reactions to this flavor. Samples may then be diluted and again the intensity of his reactions estimated.

Several other steps or systems may be used to fit the individual problem, such as having a reference sample or standard and agreement of opinion concerning it. Then give the chosen standard back to the judges on blind tests for their evaluation. This may be done until reliability is assured.

It should be remembered that a judge able to evaluate one type of product should not be labeled as capable of judging another without adequate testing and training.

A system of checking performances is necessary, because even the best judges will vary in the quality of their work.

One of the best systems is the control chart.[3] This provides a method of measuring the agreement of one individual with others. It determines when specific tasting scores must be examined and minimizes losses from failure to include results of the good tasters and from including the results that should not have been included.

Since expertness cannot replace a larger number of judgments,[4] it is suggested that much of the time and energy usually spent in selection and training might well be devoted to increasing the size of the panel, or the number judgments obtained from each member.

IV—Choosing the Tests (Types and Uses)

Appraisal of a product by panels involves many factors other than organoleptic. Selection and training of individual judges are essential points in planning such studies, but perhaps more important is the statistical design of experiment. It should give a maximum of information with minimum bias and at the least cost and effort.

The test method should set a critical situation, where human responses can be counted and handled statistically. The test should have objectivity,—i.e., the problem on hand should represent only one question to be answered at any one time.

In general, a food sensory problem will seek answers to one or more of the following three questions:

Preferred and Alternate Test Solutions

TABLE I—HOW Threshold Test Solutions Are Made

Taste	Salt	Sour	Bitter	Sweet
Material	Sodium Chloride	Lactic Acid	Caffeine	Sucrose
Mol. Wt.	58.45	90.08	194.19	342.30
Sol. No. / Molarity	Stock Sol. A. 5.845g./Liter*	Stock Sol. B. 9.008g./Liter* (8.48ml. of 85%)	Stock Sol. C. 19.419g./Liter*	Stock Sol. D. 34.230g./Liter*
1.. 0.00005	0.5 ml.A/l.	0.5 ml. B/l.	0.5 ml. C/l.	0.5 ml. D/l.
2.. 0.0001	1 ml. A/l.	1 ml. B/l.	1 ml. C/l.	1 ml. D/l.
3.. 0.0002	2 ml. A/l.	2 ml. B/l.	2 ml. C/l.	2 ml. D/l.
4.. 0.0004	4 ml. A/l.	4 ml. B/l.	4 ml. C/l.	4 ml. D/l.
5.. 0.0008	8 ml. A/l.	8 ml. B/l.	8 ml. C/l.	8 ml. D/l.
6.. 0.0016	16 ml. A/l.	16 ml. B/l.**	16 ml. C/l.**	16 ml. D/l.
7.. 0.0032	32 ml. A/l.	32 ml. B/l.	32 ml. C/l.	32 ml. D/l.
8.. 0.0064	64 ml. A/l.	64 ml. B/l.	64 ml. C/l.	64 ml. D/l.
9.. 0.0128	128 ml. A/l.**	128 ml. B/l.	128 ml. C/l.	128 ml. D/l.
10.. 0.0256	256 ml. A/l.	256 ml. B/l.	256 ml. C/l.	256 ml. D/l.**
11.. 0.0512	2.994g./l.	4.612g./l.	9.943g./l.	17.526g./l.
12.. 0.1024	5.988g./l.	9.224g./l.	19.885g./l.	35.052g./l.
13.. 0.2048	11.976g./l.	18.448g./l.	39.770g./l.	70.103g./l.
14.. 0.4096	23.953g./l.	36.897g./l.	79.540g./l.	140.206g/l.

* All solutions are made-up to 1 liter.
** Approximate solution concentration at which average threshold may be located.

TABLE II—ALTERNATE METHOD for Making Threshold Test Solutions

Taste	Salt	Sour	Bitter	Sweet
Material	Sodium Chloride	Lactic Acid	Caffeine	Sucrose
Stock Solutions	4 oz. Salt Made-up to 2.5 gal.	5½ fl. oz. 85% Made-up to 2.5 gal.	13¼ oz. Made-up to 2.5 gal.	23½ oz. Made-up to 2.5 gal.
Sol. No.	Per Gal.*	Per Gal.*	Per Gal.*	Per Gal.*
1	Blank	Blank	Blank	Blank
2	⅛ fl. oz.	⅛ fl. oz.	⅛ fl. oz.	⅛ fl. oz.
3	¼ fl. oz.	¼ fl. oz.	¼ fl. oz.	¼ fl. oz.
4	½ fl. oz.	½ fl. oz.	½ fl. oz.	½ fl. oz.
5	1 fl. oz.	1 fl. oz.**	1 fl. oz.**	1 fl. oz.
6	2 fl. oz.	2 fl. oz.	2 fl. oz.	2 fl. oz.
7	4 fl. oz.	4 fl. oz.	4 fl. oz.	4 fl. oz.
8	8 fl. oz.**	8 fl. oz.	8 fl. oz.	8 fl. oz.
9	1 pt.	1 pt.	1 pt.	1 pt.**
10	1 qt.	1 qt.	1 qt.	1 qt.
11	2 qt.	2 qt.	2 qt.	2 qt.
12	1 gal.	1 gal.	1 gal.	1 gal.

* All solutions made-up to 1-gal. with water.
** Approximate solution concentration at which average threshold may be located.

Score Card for Primary Tastes

Name H.P. Code Δ Date 5/6

Instructions: Rinse mouth with water, discard. Pour approximately 5 ml. of solution No. 1 into paper cup and taste, swish around so that it reaches all parts of the tongue. Discard. Record intensity in box under solution number. Rinse mouth again. Wait approximately 2 min., then taste solution No. 2. Use clean, dry cup for each solution. Continue through series with same procedure.

0 — No taste
1 — Very faint
2 — Noticeable
3 — Easily noticeable
4 — Strong
5 — Very strong

Solution No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Intensity	0	0	0	1	1	2	2	3	3	3	4	5	5	5

What was the taste? Salt

Number of solution at which taste was first identified 8.

EACH JUDGE is given a form like that above and is apprised (by card posted at head of table) that he is being tested for sensitivity to one of the four primary tastes: Sweet, salt, sour, or bitter. He is instructed to: (1) Read and follow instructions on form; (2) taste solutions in order—not go back; (3) not confuse perception with identity, and (4) not discuss results with anyone until tests are completed.

A. Is there a difference between samples?
B. Which difference is preferred, if there is one?
C. What is this difference?

A. Difference Testing

Methods used to answer the first question are called Difference Tests. They attempt only to determine if a difference exists between two samples. Many sensory problems can be restated to become problems of discrimination or differences, rather than those of preferences or judgments.

Here are details on the Difference Tests.

1. Single Stimuli. This method involves recognition of singly presented samples. One sample (A), which is usually the standard or control, is presented several times at the start of the session or during the training period to familiarize the judge with it. Then, one or more samples are presented singly and the panel member is asked to judge each as being A or not being A.

If several samples are presented, then sample A should be interjected at regular intervals and should be announced or identified as such. This gives the judges a reference and tends to keep the judgments anchored. Only difference between this type of test and some of the others is that the samples are presented singly. One possible advantage is that a series of samples can be tested in a shorter period of time.

In scoring this type of test, refer to the 50% chance level tables or method of analysis.

2. Paired Stimuli (or Paired Comparison). With this test two samples are presented simultaneously and the judge determines if they are the same or different.

Some believe that it is impossible to carry out a true difference test with only two samples, because such a test admits that they are different, otherwise why present them.[5]

Also, if two samples are presented even though they are similar and cannot be told apart, a judge may still have the tendency to call them different.

It is necessary, therefore, to present the samples three or four times. In some cases they must be the same, and in others they must be different. Also the judge must be informed of this fact. The paired comparison test is also a 50% chance level test.

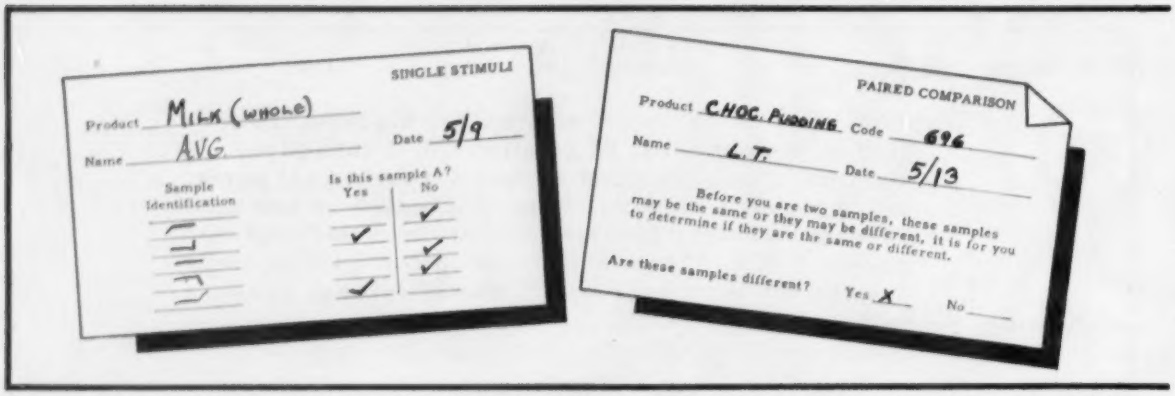
3. The Duo-Trio Test[6] is so called because it is intermediate between the Paired Comparison (A-B) and the Triangle Test (AA-B).

Of the two samples to be tested, one is selected as the control. Either may be used as the control, but if one is more familiar to the judges, or is considered as being more normal, that one is selected as the control.

This sample is presented to the judge, followed by two samples in unknown order—one to be the same as the control, the other different. The judge's problem is to say which of the two is the different one.

The observer is required to give a decision in this test, as in all difference tests. He is instructed to make a best guess if he is not sure. Reason for forcing a judgment is that when there is no difference between samples, chance alone should show about 50% correct responses.

When a difference does exist, some of the observers


SINGLE STIMULI
Product MILK (WHOLE)
Name AVG.
Date 5/9
Sample Identification
Is this sample A?
Yes
No
PAIRED COMPARISON
Product CHOC. PUDDING Code 696
Name L.T. Date 5/13
Before you are two samples, these samples may be the same or they may be different, it is for you to determine if they are the same or different.
Are these samples different? Yes X No

Single stimuli test (left) involves recognition of samples presented one at a time. In Paired Comparison test (right), judge is given two samples and must decide if they are same or different.

will detect it and their answers will no longer be guesses, but will tend to be right more often than chance alone would allow.

4. Triangle or Triangular Test. This method is the most widely used of all difference tests. Here, three samples (two alike, one different) are presented simultaneously to the panel member.

Either of the two may be the odd sample, thus allowing the following six combinations: *ABA*, *AAB*, *BAA*, *BAB*, *BBA*, and *ABB*.

It is believed, however, that greater efficiency results when the odd sample is constant and the two that are alike are the control or more familiar substance.

The triangle test has the advantage of a lower level of chance (33⅓%) than the previous methods (50%). Thus it offers a wider range of possible scores without losing statistical significance. Also, when a readily detectable difference exists, fewer judgments are required to attain statistically significant results.

5. Other Binomial Difference Tests. It is possible to establish other test systems where more than three samples are examined (still only two products).[8] The advantage being that fewer judges or fewer tests are required to obtain significant results. Main disadvantage usually is that inaccuracy often results due to fatigue or lack of concentration.

These test systems may be classified as symmetrical and asymmetrical, depending on how the number of *A* and *B* samples are distributed. A symmetrical system has the same number of *A*'s and *B*'s, such as *AA-BB* or *AAA-BBB*, while an asymmetrical system has odd combinations of *A*'s and *B*'s.

Important thing is that the former system is less efficient than the latter when the same number of samples are tested.

With reference to the four basic difference test methods, investigators at Brown University[6] have found the Duo-Trio to be the least effective, with the Triangle and Single Stimuli slightly better than the Paired Stimuli. Keeping the odd sample constant and the least familiar when applied to the Triangle Test makes it even more effective.

B. Preference or Quality Judgment

Ideal method for answering the second question (Which difference is preferred?) is to present samples to a large number of consumers, say, 500, 1,000, or more. However, tests of this type are extremely expensive and time consuming.

It is possible to get an *indication* of consumer preference by using the small panel for obtaining "quality judgment" ratings—determining whether one product is sweeter, more tender, or more aromatic, etc., than another.

Here are types of tests that can be used:

1. Numerical Scoring. When it is desired to compare *two* or more products for some quality judgment, they can be assigned a relative numerical score by the judge. There are many scoring scales in use—generally having 5 to 15 points, described in terms indicating degrees of excellence.

Graduations will depend on the number of intervals the judge can distinguish. Uniformity of opinion is likely to increase with a decrease in the number of units in a scale. But if the scale is too narrow it will lack statistical value.

Weight given to the grade should be determined by preliminary testing. Each grade must represent an equal difference in quality, and the terms used to describe two successive qualities should be selected so as to express equal differences in sensation.

It is possible to use a scale of, say, 0-10, with no definitions of the units, provided the panel members have been orientated as to its meaning. However, the judges have a tendency to limit themselves to a small portion of such a scale.

Variants (two or more) to be tested may be presented by themselves for relative scoring by the judges. However, it is better if a standard accompanies them. It is presented in duplicate, one an open standard to which an arbitrary score is assigned, the other a blind standard.

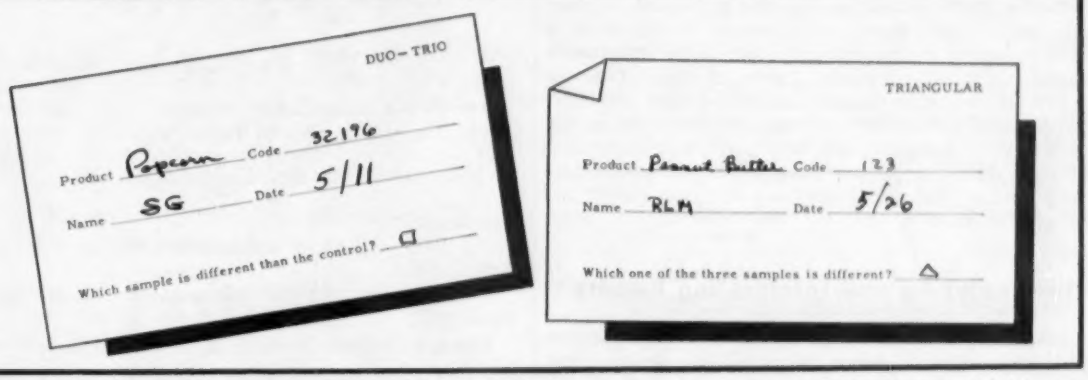
Usually the latter will receive a different score than that assigned to the former. Scores of the variants should only be compared to the blind standard.

2. Ranking. When three or more products are to be arranged in ordinal sequence with respect to some stated quality, a ranking test is used. Here, the highest rated sample is scored 1, the next 2, etc. Ranking scores tend to follow numerical scoring results inversely.

Ranking results also differ from numerical scoring results in that they disregard the amount or degree of difference between samples. However, ranking may be helpful in determining mean preference of a group, which may include judges of widely divergent opinions as to the acceptability of a certain quality judgment.

3. Paired Comparison (ranked data). This is a system whereby three (or more) products or treatments may be compared for some particular attribute.[7] It differs from the ranking test in that the judge examines the samples in pairs. If one of the pair has more of the attribute under

These Tests Answer Question:


DUO–TRIO
Product Popcorn Code 32196
Name SG Date 5/11
Which sample is different than the control? □
TRIANGULAR
Product Peanut Butter Code 123
Name RLM Date 5/26
Which one of the three samples is different? △

Duo-trio test (left) requires decision as to which of two samples differs from control. Triangle test (right) uses three samples—two alike, one different. Here, judge must ferret out different one.

study, the judge gives it a rank or score of 1. If it has less, he records the value 2.

Interpretation of results is facilitated by tables.[8] In addition, the developers have provided for treatment of the following possible conditions: (a) That the judges are consistent as a group, or (b) that each judge is consistent as an individual but the panel may not be consistent.

C. Descriptive Tests

Frequently a difference is found where it would be helpful to know in what way the samples differed. This knowledge could be used as a guide for further changes and improvements.

Most widely used method for describing differences is to have the members openly evaluate the problem while gathered around the panel table.

Some attempt at a quantitative evaluation has been developed by the Arthur D. Little, Inc. The method is termed "Flavor Profiles"[9] and is designed to indicate degrees of differences between samples on the basis of the intensity of individual character notes, the degree of blending, and the overall amplitude. Slight changes in the method[9] have been suggested by Foster D. Snell Inc., N. Y. C.

V—Drafting Procedures and Conditions

Now that the panel has been selected and trained, something is known about the types of tests to use, what facilities are needed, and what precautions should be taken. Following are suggested conditions and procedures for the testing.

Location. If possible, all testing or odor work should be done in a special room. Often, however, it is necessary to judge in the laboratory, or some other place where experiments or actual preparation of samples is going on. In this case, it is important to remember that, for complete concentration by the judges, a quiet, pleasant atmosphere should prevail.

Booths. It is desirable to have individual panel booths. These allow for segregation of judges in order to insure separate responses and prevent the conveying of expressions and impressions.

Possible arrangements are: (a) Round table with fan-wise booths, or (b) a long table divided into booths on one or both sides.

Booths or room should be provided with ample disposal facilities. Color of booths, table, and room should be light or neutral gray, or off-white.

Ventilation and Lighting. Ideally, the judging location should be entirely air conditioned or well ventilated and free from all odors that might interfere with accurate detection of differences.

If appearance is a factor, then possibly, consumer lighting conditions should be simulated. In many cases controlled lighting is desirable, such as a spot lighting system containing natural, red, and blue lights, and affording control of intensity. By these means the response to color differences may be either augmented or on the other hand, eliminated.

Preparation and Serving. Different products present specific problems. However, the samples presented to the observer must be exactly alike in respect to all factors other than those to be evaluated.

Size of the sample should be of sufficient amount for two or three bites.

Samples of one type should be tested at the same temperature—usually at the normal serving temperature for that item.

They should be presented in identical containers. Container and eating utensils should be tasteless and odorless and preferably of a gray or white background.

Number of Samples Per Session. Limiting factor on the number of samples that can be presented at any one sitting is sensory fatigue. This is prominent in the tasting of certain types of foods, while it is practically negligible in others.

In general, however, a trained panel can accurately score from two to eight samples per session with as little as 30 min. between sessions being required for sensory recovery.

Coding. Actual identity of samples must be concealed. However, they should be code marked with letters, numbers, combinations of numbers and letters, colors, geometric shapes, or other symbols.

The code should not be suggestive to the panel. Also, a group may have a definite bias for one code marking over another. This can be minimized by (a) selecting code pairs which have been demonstrated to show little bias, and by (b) reversing codes between test halves.[10]

It is also possible for a group to have a bias for a particular position, such as the middle position in a triangle test. They may consciously or unconsciously select one sample rather than another as the odd sample in the absence of noticeable flavor differences. Thus, the assignment of code markings should be made by some method which insures randomness.

Information. The panel members should be given all possible information as long as they cannot identify a particular sample and do not become prejudiced. A judge may be told such things as the reason for the study or what instigated it, the type and need for the information sought, and possibly the present status of information.

Instructions. It is desirable to have written directions and prepared scoring forms for distribution to the judges. They must be complete, specific, and as simple as possible. Thought should be given to them beforehand to minimize complications that might arise and to insure proper and meaningful answers.

VI—Analyzing and Interpreting Results

Since most of the difference and quality judgment tests hinge on the laws of chance and probability, it is necessary to have some understanding of statistical methods. It must be remembered, however, that statistical techniques are but efficient tools for analysis of results and will not change the basic character of unsound data.

The following statistical formulas and examples may be used as guides in determining significance of results obtained with sensory panels.

Difference Testing Analysis

For *50% Chance Level Tests* (Single Stimuli, Paired Stimuli, Duo-Trio) use the following formula, or refer to Table III to determine if there is a significant difference at the 5 and 1% level of probability:

$$x^2 = \frac{[(X_1 - X_2) - 0.5]^2}{N}$$

where x = individual score or measurement
X_1 = number of correct answers
X_2 = number of incorrect answers
N = number of judges $(X_1 + X_2)$

When N=200, or more, it is not necessary to subtract 0.5.

Significance:

5% level of significance=3.84 (x^2 values below this figure are not significant.)

1% level of significance=6.63 (x^2 values above this are highly significant.)

Example: Suppose N=20, X_1=15, and X_2=5, then

$$x^2 = \frac{[(15 - 5) - 0.5]^2}{20}$$

$$= \frac{(10 - 0.5)^2}{20} = 4.51 \text{ (a significant difference)}$$

For *33% Chance Level* (Triangle Tests), use the following formula, or refer to Table IV:

$$x^2 = \frac{[(2X_1 - X_2) - 0.5]^2}{2N}$$

Significance:

5% level = 3.84 (x^2 values below this are not significant)

1% level = 6.63 (x^2 values above this are highly significant)

Example: Suppose N = 20, X_1 = 11, and X_2 = 9, then

$$x^2 = \frac{[(2[11] - 9) - 0.5]^2}{2(20)} = \frac{(12.5)^2}{40} = 3.91 \text{ (a significant difference)}$$

Quality Judging Testing

For *Numerical Scoring Tests*, use the following formulas in determining significance of differences of average scores of samples tested. Here, calculation of standard error of difference between means takes into consideration the correlation between scores given to the two samples under comparison by: (1) Finding the difference (d) between the scores given to the two samples by the various tasters: $d = X_1 - X_2$; (2) then determining the standard deviation of the differences between scores

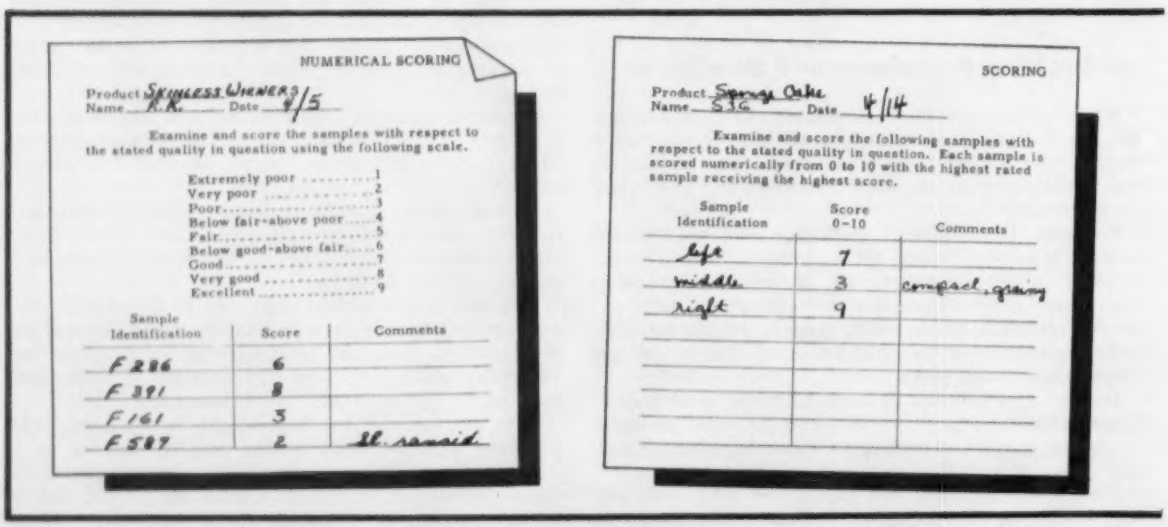
$$\sigma_d = \sqrt{\frac{\Sigma d^2}{N} - \bar{d}^2} \quad \text{or} \quad \sqrt{\frac{\Sigma d^2}{N-1} - \frac{(\Sigma d)^2}{N(N-1)}}$$

where Σ = summation, and $\bar{d}$ (bar d) = average difference $(\bar{X}_1 - \bar{X}_2)$, and (3) determining the standard error of difference between means, using the standard deviation of paired differences (coefficient of correlation)

$$\sigma_{(\bar{x}_1 - \bar{x}_2)} = \sqrt{\frac{\sigma^2_d}{N}}$$

where $\overline{X}$ average $= \frac{X}{N}$

Quality Judgment by Small Panels



NUMERICAL SCORING

Product Name R.K. Skinless Wieners Date 4/5

Examine and score the samples with respect to the stated quality in question using the following scale.

Extremely poor 1
Very poor 2
Poor 3
Below fair-above poor 4
Fair 5
Below good-above fair 6
Good 7
Very good 8
Excellent 9

Sample Identification	Score	Comments
F 286	6	
F 391	8	
F 161	3	
F 587	2	ill. ranoid

SCORING

Product Name S.C. Sponge Cake Date 4/14

Examine and score the following samples with respect to the stated quality in question. Each sample is scored numerically from 0 to 10 with the highest rated sample receiving the highest score.

Sample Identification	Score 0-10	Comments
left	7	
middle	3	compact, grainy
right	9	

TWO suggested forms for numerical scoring. One on left clearly defines scales to be used. One on right gives no definitions of units, instead relies on previous orientation of panel members as to meaning of numbers in scale.

To determine significance, calculate the critical ratio

$$(C.R.) = \frac{d}{\sqrt{\frac{\sigma_d^2}{N}}}$$

Interpret this value for level of significance or probability by using area under Normal Curve (tables) if degrees of freedom ($N - 1$) are more than 30, or by the Student's "t" tables if degrees are 30 or less.

Example: Eleven judges score two samples (X_1 and X_2) for some quality judgment on a scale of 0 to 10 points.

Scores		Differences	
X_1	X_2	d	d^2
10	6	+4	16
6	7	−1	1
10	7	+3	9
7	4	+3	9
9	10	−1	1
10	5	+5	25
8	10	−2	4
10	6	+4	16
9	8	+1	1
10	8	+2	4
9	10	−1	1
$\Sigma X_1 = 98$	$\Sigma X_2 = 81$	$\Sigma d = +17$	$\Sigma d^2 = 87$

$$\bar{d} = \frac{17}{11} = 1.546$$

$$\sigma_d = \sqrt{\frac{87}{11-1} - \frac{(17)^2}{11(11-1)}} = \sqrt{6.073}$$

$$C.R. = \frac{1.546}{\sqrt{\frac{6.073}{11}}} = \frac{1.546}{\sqrt{0.552}} = 2.08 \text{ (No significant difference)}$$

For *Ranking Tests* use the following formulas in determining the significance of differences between means (must have at least 3 samples and by 10 or more judges):

First determine the standard deviation (σ) of scores for a sample.

$$\sigma = \sqrt{\frac{\Sigma X^2}{N} - \bar{X}^2} \quad \text{or} \quad \sqrt{\frac{\Sigma X^2}{N-1} - \frac{(\Sigma X)^2}{N(N-1)}}$$

Meaning of Symbols

X	= An individual score or measurement
Σ	= Summation
ΣX	= Sum of individual measurements
$\bar{X}$	= Average (read X bar) = $\frac{\Sigma X}{N}$
N	= Number of measurements, number of judges, or number of pairs of scores
σ	= Standard deviation or variance (read sigma) $\sigma = \sqrt{\frac{\Sigma X^2}{N} - \bar{X}^2}$ or $\sqrt{\frac{\Sigma X^2}{N-1} - \frac{[\Sigma X]^2}{N(N-1)}}$
$N-1$	= Use when there are fewer than 30 judges or measurements
$\sigma_{\bar{X}}$	= Standard error of an average = $\frac{\sigma}{\sqrt{N}}$
$\sigma_{(\bar{X}_1-\bar{X}_2)}$	= Standard error of difference between two means = $\sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{N_2}}$
d	= Difference between a pair = $X_1 - X_2$
$\bar{d}$	= Average difference = $\bar{X}_1 - \bar{X}_2$
σ_d	= Standard deviation of differences $\sigma_d = \sqrt{\frac{\Sigma d^2}{N} - \bar{d}^2}$ or $\sqrt{\frac{\Sigma d^2}{N-1} - \frac{[\Sigma d]^2}{N(N-1)}}$
ΣX^2	= Individual measurements squared and their sum taken
$[\Sigma X]^2$	= Sum of individual measurements, squared
Σd^2	= Differences squared and their sum taken
$[\Sigma d]^2$	= Sum of differences, squared
χ^2	= Chi-Square
C.R.	= Critical ratio

Then determine standard error of difference between means of the two samples under comparison.

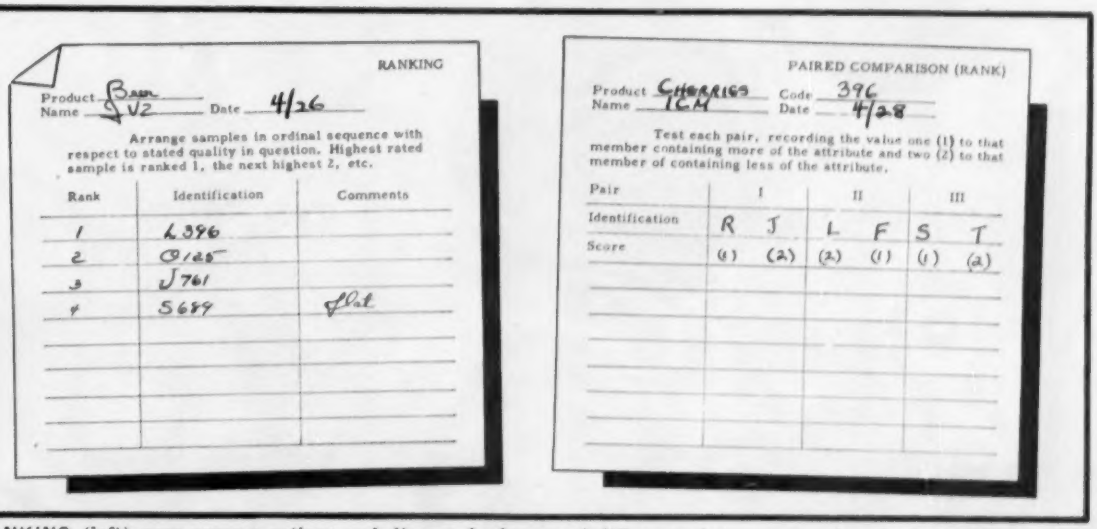
$$\sigma_{(\bar{X}_1 - \bar{X}_2)} = \sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{N_2}}$$

To determine significance, calculate the critical ratio:

$$C.R. = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{N_2}}}$$

Interpret this value for level of significance or proba-

Indicates Customer Preferences



RANKING

Product Name Bean V2 Date 4/26

Arrange samples in ordinal sequence with respect to stated quality in question. Highest rated sample is ranked 1, the next highest 2, etc.

Rank	Identification	Comments
1	L396	
2	C/25	
3	J761	
4	S699	Flat

PAIRED COMPARISON (RANK)

Product Name CHERRIES ICM Code 396 Date 4/28

Test each pair, recording the value one (1) to that member containing more of the attribute and two (2) to that member of containing less of the attribute.

Pair	I		II		III	
Identification	R	J	L	F	S	T
Score	(1)	(2)	(2)	(1)	(1)	(2)

RANKING (left) uses reverse ratings and disregards degree of difference between samples. In Paired Comparison (right), judge examines two samples at once in evaluating mutiple products or treatments.

A for apple is the beginning of most primers. And apple is the first choice in flavor with most Americans, who enjoy an alphabet of apple dishes. To the distinguished family of Firmenich flavors, now enhancing many food products, is added that of Apple, captured by patient research and recreated by chemical skill. It is another Firmenich achievement, already welcomed by manufacturers who have added this popular flavor to their line of products; by others to improve those already established. Highly concentrated, stable, of the utmost fidelity and purity, Imitation Apple by Firmenich is offered with pride for your profitable use. Samples and technical data on request.

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bility by using area under the Normal Curve (tables) if degrees of freedom (2N − 2) are more than 30, or use the Student's "t" tables if the degrees are 30 or less.

Example: Eleven judges rank four samples (x_1, x_2, x_3, and x_4) for some quality judgment.

X_1	X_2	X_3	X_4	X_1^2	X_2^2	X_3^2	X_4^2
2	3	4	1	4	9	16	1
1	3	4	2	1	9	16	4
3	4	1	2	9	16	1	4
2	1	4	3	4	1	16	9
4	1	3	2	16	1	9	4
4	1	2	3	16	1	4	9
3	2	4	1	9	4	16	1
4	3	2	1	16	9	4	1
2	4	1	3	4	16	1	9
4	3	2	1	16	9	4	1
3	4	1	2	9	16	1	4
$\Sigma X = 32$	29	28	21	$\Sigma X^2 = 104$	91	88	47

$$\overline{X}_1 = \frac{32}{11} = 2.909 \qquad \overline{X}_4 = \frac{21}{11} = 1.909$$

Let us compare X_1 and X_4, since they have the biggest difference in mean:

$$\sigma_{X1} = \sqrt{\frac{\Sigma X^2}{N-1} - \frac{(\Sigma X)^2}{N(N-1)}} = \sqrt{\frac{104}{10} - \frac{(32)^2}{110}} = \sqrt{1.08}$$

$$\sigma_{X4} = \sqrt{\frac{\Sigma X^2}{N-1} - \frac{(\Sigma X)^2}{N(N-1)}} = \sqrt{\frac{47}{10} - \frac{(21)^2}{110}} = \sqrt{0.691}$$

$$\text{C.R.} = \frac{\overline{X_1} - \overline{X_4}}{\sqrt{\frac{X_1^2 - X_4^2}{N}}} = \frac{2.909 - 1.909}{\sqrt{\frac{1.08 - 0.691}{11}}} = 2.49 \text{ (a significant}$$

difference when using "t" tables.)

For *Paired Comparison* (Ranked Data), see References 5 and 7 (below) for gaging of significance of scores.

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Tables Aid in Analyzing Panel Results

TABLE III—PROBABALITIES for 50% Chance Level Tests

No. of tasters or tastings	No. of Correct Answers necessary to establish significant differentiation P=0.05	P=0.01	No. of tasters or tastings	No. of Correct Answers necessary to establish significant differentiation P=0.05	P=0.01
			45	29	31
9	8	..	46	30	32
10	9	..	47	31	33
11	9	10	48	31	33
12	10	11	49	32	34
13	10	11	50	32	34
14	11	12	51	33	35
15	12	13	52	33	36
16	12	13	53	34	36
17	13	14	54	34	37
18	13	15	55	35	37
19	14	15	56	35	38
20	15	16	57	36	39
21	15	17	58	37	39
22	16	17	59	37	40
23	17	18	60	38	40
24	17	19	61	38	41
25	18	19	62	39	41
26	18	20	63	40	42
27	19	20	64	40	43
28	19	21	65	41	43
29	20	22	66	41	44
30	21	22	67	42	44
31	21	23	68	42	45
32	22	24	69	43	45
33	22	24	70	43	46
34	23	25	71	44	47
35	24	25	72	45	47
36	24	26	73	45	48
37	25	27	74	46	48
38	25	28	75	46	49
39	26	28	100	60	63
40	27	29	200	114	118
41	27	29	300	167	172
42	28	30	400	220	226
43	28	30	500	277	279
44	29	31	1,000	531	541

TABLE IV—PROBABILITY for 33⅓% Chance Level Tests*

No. of Tasters or Tastings	No. of Correct Answers Necessary to Establish Significant Differentiation P=0.05	P=0.01	P=0.001	No. of Tasters or Tastings	No. of Correct Answers Necessary to Establish Significant Differentiation P=0.05	P=0.01	P=0.001
7	5	6	7	40	20	22	24
8	6	7	8	41	20	22	24
9	6	7	8	42	21	22	25
10	7	8	9	43	21	23	25
11	7	8	9	44	21	23	25
12	8	9	10	45	22	24	26
13	8	9	10	46	22	24	26
14	9	10	11	47	23	25	27
15	9	10	12	48	23	25	27
16	10	11	12	49	23	25	28
17	10	11	13	50	24	26	28
18	10	12	13	51	24	26	29
19	11	12	14	52	25	27	29
20	11	13	14	53	25	27	29
21	12	13	15	54	25	27	30
22	12	14	15	55	26	28	30
23	13	14	16	56	26	28	31
24	13	14	16	57	27	29	31
25	13	15	17	58	27	29	32
26	14	15	17	59	27	30	32
27	14	16	18	60	28	30	33
28	15	16	18	65	30	32	35
29	15	17	19	70	32	34	37
30	16	17	19	75	34	36	39
31	16	18	19	80	35	38	41
32	16	18	20	85	37	40	43
33	17	19	20	90	39	42	45
34	17	19	21	95	41	44	47
35	18	19	21	100	43	46	49
36	18	20	22	300	117	122	127
37	18	20	22	500	188	194	202
38	19	21	23	1,000	363	372	383
39	19	21	23	2,000	709	722	739

* Roessler, E.B., Warren, J., and Guyman, J.F. "Significance in Triangular Taste Test." *Food Research* 13, 503, 1948.

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The regulars were now 'hot at it'

Ole Sage Episode

GRIEVANCE ARBITRATION

What are its limitations? . . . How resolve 'rightness' and 'fairness'? . . . And where does the contract come in?

IVAN C. MILLER
Associate Editor, "Food Engineering"

For years, food men from all over the city had been getting together at the periodic, informal sessions of the Guff & Gripe Luncheon Club. A common interest drew them—the many, ever-changing management problems that occur in food plant operation.

Today's luncheon had already progressed to coffee and cigars (mostly pipes), and the regulars were now "hot at it"—the battle this time being over the subject of arbitration.

The question was: "Is it or isn't it a successful, fair means of settling grievances—and how far does it go?"

Grumbled Batt Bulwark, works manager of Mull & Mull Co.: "Almost every time a grievance at our plant goes to Arbitration we get a raw deal—the decision usually favors the union."

"Could it be," chuckled Silas Worth, personnel manager at Zenith Canning Co., "that from the beginning the company was wrong on each issue?"

"No," came back Batt, "I don't think so. The trouble is that when you go to Arbitration you get a long-haired lawyer's idea of what's 'legal'—not what's right and fair."

He puffed angrily on his briar, then burst out: "What do those swivel chair mugs know about a food plant? Do they realize what it takes to hold production and at the same time hold jobs for everybody? Of course they don't."

Si now cast an inviting eye over to Ole Sage, remembering how this veteran had, down the years, served both labor and management in these hassles.

Ole thought a moment, then took Si's cue. "Sounds to me," he said, "as though Batt is hoping to get things out of Arbitration that should have been set forth in the contract negotiation. It's at the table, before the contract is signed, that you ought to establish those definitions of 'rights' and 'fairness'."

"What do you mean?" demanded Batt huffily. "It seems to me that we have a right to demand respect for management prerogatives any time or any place."

"Well, let me explain," said Ole. "None of you would think of sharpening a pencil with an ax any more than trying to chop down a tree with a pen knife. You see," he continued, "its the same thing with grievance arbitration, which is a special purpose tool of industrial relations.

"Like most tools, it has proper uses—but also limitations. Arbitration produces most valuable results when handled correctly, but it leads to disappointment when abused or warped to do what it was never intended for. And one of the things grievance arbitration was not intended for is determination of contract terms.

"When a case goes to arbitration, it's assumed that what both parties want is a judgment of how the contract, as drafted by the parties, should be applied to the particular situation—rather than the arbitrator's view of how the

Meet Old Sage . . .

Up the hard way came Ole, our principal character in this special series of "cases," fictionized to pinpoint boss-worker problems in the 1955 food plant.

Ole began as a laborer, proved himself "a good worker" who "used his head"—thus won the respect of both workers and bosses. He later rose to foreman, then superintendent. And finally he was management's choice as "a natural" to head Industrial Relations, a job he carried out with unusual success until his retirement.

—Actually, his was a very short retirement. Because his old company, and others, too, quickly were calling on him for counsel—as related in these episodes.—*The Editors*

contract should have been written."

Ole paused, looked around the group. "Let me illustrate my point with a case I sat in on some time ago, under American Arbitration Assn. rules."

"After several years of hiring at varying wage rates to meet the needs of a fluctuating market, the management of this big packing plant and the union decided upon a joint job-evaluation plan, with new job descriptions and grouping of jobs into labor grades and rates with the purpose of eliminating inequities.

"It was agreed that employees who found themselves in jobs that were undergraded were to be given increases to the new levels. On the other hand, no worker was to have his pay cut or be downgraded.

Question of Sam Gow

"Here, Sam Gow entered the picture. He was a machine operator—one of the men holding a 'red circle' rate. He was getting $73 a week on a job which, according to job evaluation, should pay only $63.

"Anyhow, a vacancy had occurred in another department on a job that happened to pay $73. So management promptly ordered Sam transferred to that job.

"Of course the union protested. The business agent argued that vacancies are supposed to be filled by promotion on the basis of seniority. He cited the collective bargaining agreement: 'A vacancy in any position, or a newly created position, shall be filled by promotion of a qualified employee on the departmental seniority list.'

"The union emphatically contended that transferring Sam would represent a cut in promotional opportunities, thereby adversely affecting the employees in general.

"Answer of the company was that Sam's pay would not be reduced by transfer. The personnel manager explained that unless he were transferred to a job commensurate with his pay, inequities would thus be perpetuated, not corrected. And this was contrary to the principle of the job-evaluation plan."

How Arbitrator Saw It

Concluded Ole: "The arbitrator's decision in this case was very instructive. It pointed up the argument I have been trying to get across to you fellows.

"The arbitrator reminded the parties that, regardless of his own views on what might constitute good industrial-relations practice, he could neither add to nor modify the contract

"He drew attention to the fact that at the time of the job-evaluation plan, the right of employees to fill vacancies by promotion was clearly established, and there was nothing to indicate that the union had abandoned that right in bargaining.

"He then added that, to the extent there was reasonableness in the company's arguments in favor of eliminating inequities, it was a matter for negotiation between the parties—and not for settlement by arbitration."

Editor's Note: The decision quoted in this episode is taken from an actual case weigned under rules of the AAA, with a fictional name used for the worker involved.

Particularly, readers should not infer that other arbitrators would reach the same decisions in apparently similar cases, since circumstances differ widely, thus altering the factors.

Rather than being based on precedent, decisions derive from case history, points of specific contracts, and pertinent evidence.

From Ole's Notebook

OBSERVATIONS

'Hidden' Profits 'Inflated'

Sometimes management doesn't choose to explain the dollar facts about the business to the employees. But it doesn't thereby prevent the workers from drawing their own conclusions.

■ **When company income is kept secret, employees don't therefore assume that profits are low. Rather their attitude is that "the management must be withholding this information because profits are exceptionally high."**

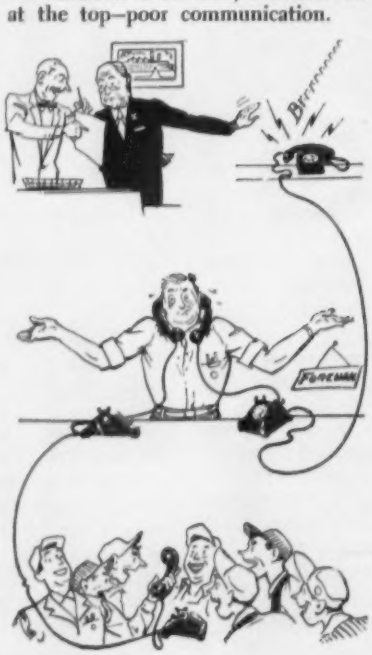
Checks have been made of this situation in a number of companies which have withheld profit figures. Here, employees have been asked to guess the profits. And in virtually every case they over-estimated, often by several hundred percent.

Foreman Downs and Ups

Communication from the foreman down to his employees is generally far better than up to his superiors.

As a result, the foreman finds it easier to be concerned with his responsibilities relative to the welfare of those under them. And this concern of the supervisor often gets far out of proportion to his appreciation of his managerial responsibilities.

■ **When this is the case, the fault lies at the top—poor communication.**



Checking on Applicants —Phone vs. Mail

Even if someone must be specially hired to do it, checking job applicant's references by phone is cheaper in the long run than the traditional mail way.

So concludes Minneapolis-Honeywell Regulator Co. after a study of the hidden costs.

True, a written reference check was found to cost only 9c. per applicant, including postage and accounting for those not returned. But only 76.6% of the forms were returned. And because of the time lag, applicants had to be hired on a probationary basis before the results became known.

Of 1,239 new factory employees hired during the period under study, 90 were dropped by the company. Of these, 28 were rated as poor risks by former employers, while reference checks had not been returned for 36. Only 26 had been rated fair-to-good on the reference forms.

■ **In contrast, the company got quick checks on 91% of another group of applicants by using the phone.**

Had it not hired the 28 later given poor references, the company esti-

If you want lower cost body blanks, join the swing to this modern

HAMILTON 401 DUPLEX SLITTER

Here's one of the "hottest" new machines in Hamilton's complete line of modern, high-speed can-making machinery. And we're not a bit surprised that it has been such a "smash-hit" . . . ● The big demand for our 401 Duplex Gang Trimmer and Slitter confirms our belief that a faster, better slitter is needed to permit increased can production. ● This Hamilton 401 Slitter is so very advanced that it has made obsolete other slitters as new as five years old. Here are four specific reasons why it'll pay you to switch to our modern 401:

1. Its *streamlined*, simplified design provides maximum accessibility and easy adjustments.
2. *Sturdier*, more rigid construction means far less downtime. Both units are mounted solidly on a massive, heavily reinforced base to prevent distortion and misalignment.
3. It's about *40% faster* than other "new" slitters and easily meets the need for higher production rates.
4. *Greater accuracy* is assured by its ruggedness and precise gauging. It exactly duplicates litho press gauges. It'll cut your rejects and improve your product quality.

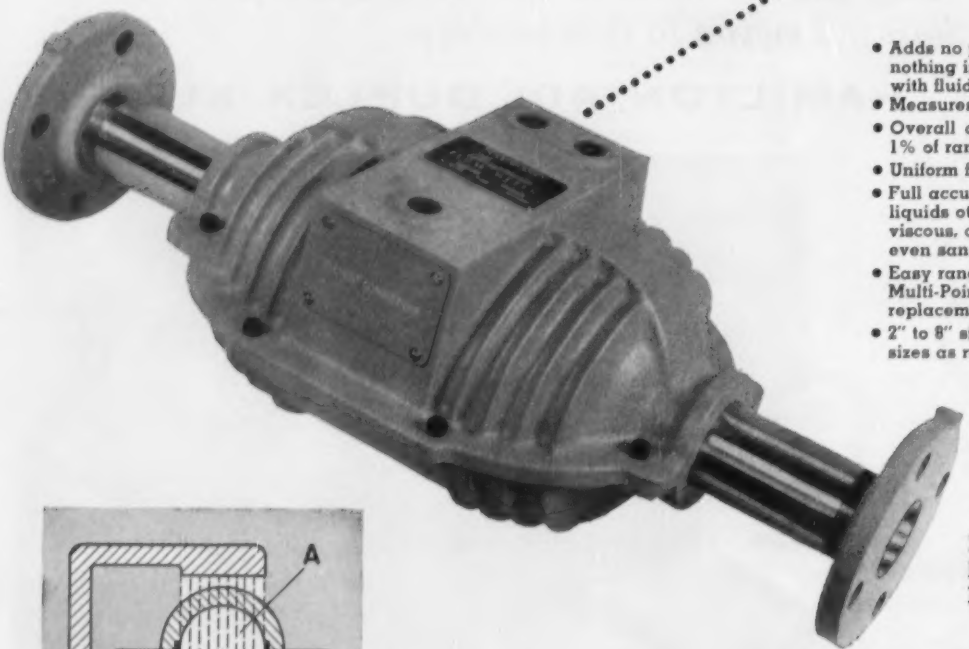
For further facts about the 401 Slitter or other machines in Hamilton's complete line of equipment required for making all kinds of cans, please write to:

Hamilton Division, Hamilton, Ohio

BALDWIN-LIMA-HAMILTON

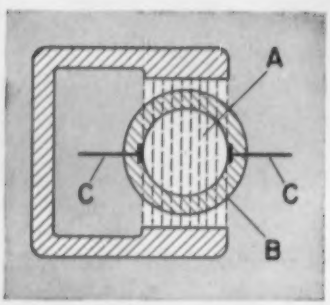
For more information, use coupon on last page.

NEW! a flow meter with no flow restrictions!



- Adds no pressure drop — nothing inside pipe to interfere with fluid flow.
- Measures fluid velocity directly.
- Overall accuracy better than 1% of range over entire scale.
- Uniform flow scale.
- Full accuracy sustained even on liquids other meters can't handle: viscous, corrosive, or pulpy — even sand-water slurries.
- Easy range change — either by Multi-Point Switch or range coil replacement, as preferred.
- 2" to 8" sizes standard — larger sizes as required.

FOXBORO MAGNETIC FLOW METER



SIMPLE, TROUBLEFREE, OPERATION

The Foxboro Magnetic Flow Meter operates on the same principle as a power generator. A magnetic field (A) is maintained through a standard pipe section (B) of stainless steel or other non-magnetic material. This pipe section is lined with Kel-F® or other insulating material. Liquid passing through pipe acts as moving conductor, generating an electric voltage which varies in proportion to liquid's average velocity. Flush electrodes (C) in pipe wall "pick up" this voltage which is recorded in desired flow units by Dynalog Electronic Recorder or Controller.

This premium-performance meter measures *magnetically* the flow rate of virtually any liquid except hydrocarbons. It completely ignores such common metering headaches as turbulence, suspended solids, and variations in conductivity, density, and viscosity. It even measures reversing flows.

Installation is simple. The magnetic spool piece connects into the line like any equivalent length of pipe — no seals, purges, meter runs, or straightening vanes required. Connects by 2-conductor cable to remote Dynalog Electronic Flow Recorder.

Maintenance is practically eliminated. There are no pressure taps to become plugged or frozen, no working parts to foul.

Foxboro Magnetic Flow Meters are already in use on such widely different liquids as beer, sand-and-water, rosin size, rock-and-acid slurry, viscose, and highly corrosive liquid detergent. Find out how this precise, troublefree flow meter can help your processing. Write for complete details.

THE FOXBORO COMPANY, 307 NEPONSET AVENUE, FOXBORO, MASS., U. S. A.

FOXBORO
REG U S PAT OFF

Foremost in FLOW METERING

FACTORIES IN THE UNITED STATES, CANADA, AND ENGLAND

mates it would have saved $3,640, since the cost of putting an employee on the payroll ran to $130 (including $100 for training).

(By using phone checks where former employers are in the city and written checks where they are not, the company figures it can get references on 98% of all applicants.)

CLIPPINGS & COMMENTS

Fringe Fable

Applying for employment, a man asked the personnel manager: "Does the company pay my Blue Cross insurance?"

Came the answer: "No, you pay for it. It's deducted from your salary each month."

"Last place I worked they paid for it," the applicant said.

"Did they pay for your life insurance policy, too?" the interviewer asked.

"Sure."

"Did you have profit sharing?"

"Sure thing."

"Two and three-week vacations?"

"Yep."

"A guaranteed annual wage?"

"Yes, and they had big bonuses, and gifts for your birthday, and—"

"Why did you leave?"

"The company folded." — *Pira-Scope (Personnel & Industrial Relations Assn., Inc., Los Angeles).*

Listening Is Key

Perhaps the most eloquent of all forms of our communication is listening.

Communication is an *exchange* of messages, and here one-way communication is as feeble and futile as any other one-way relationship.

Employees have many things they want to tell management—if management will but let them. And listening is the beginning of these successful human relations.—*Human Relations in Small Industry, McGraw-Hill Book Co., Inc.*

"Bill" or "That Employee"?

It pays to treat employees as individuals.

Just how? There are many ways. For instance, the president of one company sends every new employee

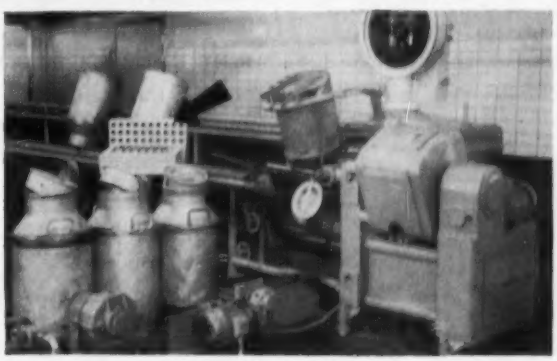
a personal letter welcoming him into the organization.

Some measure of the impact of this simple gesture can be realized by the fact that within a few weeks after this practice was started, the principal union borrowed the idea—now also sends a letter of welcome to each new employee.—*AMA Conference News.*

• • •

Automatic Dump-&-Weigh

★ Needs Only 1 Man to Put Through 15 Milk Cans a Minute



No Hand Work

—is needed with this latest dairy equipment. Control panel (arrow) runs all phases of dumping and weighing.

GEORGE WILLIAMSON
McGraw-Hill World News, Sweden

Fully 900 cans of milk are now being automatically dumped and weighed hourly at Orebro Dairy, Orebro, Sweden.

This betters semi-automatic performance by a good round 200 cans—a striking jump engineered with a new machine that not only abolishes all hand-written records but also minimizes the pushbutton work of the one man needed for operating the speedy unit.

This is how the machine does the job:

Cans move into the plant by conveyor from trucks, whereupon a stopper device holds cans in line until the lift mechanism is in loading position.

Next, an automatic feeler control allows a single container to slide into place. Then the lift and dump mechanism are actuated.

When one supplier's cans are finished, a single pushbutton starts the following action: (1) Unit prints date, van, and supplier code numbers (previously fed into machine) on two tapes; (2) scale records total weight of dumped milk; and (3) a motor-controlled discharge valve opens to drain the weighing-in tank.

The equipment features two of these tanks (each holding 550 lb.) to provide uninterrupted operation.

If one holding tank fills with milk before a supplier is finished, dump-lift will stop while weight is recorded. After the motor-valve opens, dumping continues into the second tank.

On a series of small lots—where robot control is impractical—unit can be set for semi-automatic operation. Here, a foot-pedal is tripped at the start of each lot, to feed cans to lift. And, for each can, a pushbutton is used to start the lift mechanism.

Lift-dump equipment is designed and built by Fredriksons Verkstadts Aktiebolaget, Vadstena, Sweden. Weight scale and controls are by Lindells Scales Factories, Joenkoeping.

Every 10 Seconds

there's a completely new filter face on a

DICALITE FILTERCAKE

For all practical purposes, that means that you have a *continuously fresh* filtering surface—all the time—for consistent clarity and constant flow rate. The mechanism of this is simple. The particles of Dicalite filteraid added to the raw liquor as "body-feed" travel with the liquor into the filter; there they are caught and held by the precoat or filtercake on the filter screens (together with the unwanted solids from the liquor) while the clarified liquor continues through.

This unretouched photograph of a section through an actual Dicalite filtercake shows the even dispersion of unwanted impurities throughout the cake and how easily the clean precoat peels from the screen or cloth. Inset shows surface magnified 75 times.

This continuously fresh filter face means that unwanted solids cannot mass together to blind the screen and halt the filtering action—a point of major importance in the case of slimy, sticky or gelatinous impurities. Instead, they are dispersed, distributed through the filtercake in such scattered fashion that the millions of microscopic channels through the filtercake remain open for maximum throughput combined with exceptionally "sharp" separation of solids.

No matter what your filtration problem, whether it be desired clarity or fast flowrate, it is very probable that it can be answered with one or another of the Dicalite family of filteraids . . . the finest in diatomaceous materials. For complete information, write to

1930 • 1955
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Dependable GLC GREAT LAKES Dicalite® DIATOMACEOUS MATERIALS

DICALITE DIVISION: GREAT LAKES CARBON CORPORATION, 612 S. FLOWER ST., LOS ANGELES 17, CALIFORNIA

For more information, use coupon on last page.

START . . .

Pickline items are placed on this belt in response to loudspeaker instructions from the foreman, seen in "pulpit" (arrow). Exact amount of items needed is pre-palleted in this area from IBM invoice totals.

They Load *With New Speed*

. . . using special fork-like belt arrangement, in which stepped-up case-and-bag movement is directed from a unique "pulpit"

HERE IS A JIFFY-HANDLING system that offers practical loading–and unloading–tips to industry operators.

Now in operation at Consolidated Foods distribution center near Chicago (FE June, p. 99), this setup features low-cost truck loading of multi-item produce orders.

Among other likely applications, this system could be used to advantage in eliminating lift-truck operations in congested areas.

And, furthermore, in reverse, it could be employed for centralized palletizing in an area for incoming goods, with unloading from several trucks at once.

Layout Details

At Consolidated, a loudspeaker relays the count, whereupon packages are rushed by low-level conveyors–some of them flexibly portable–from pick lines to waiting trucks.

Photo-electric eyes double-check the invoices. Electrical outlets are set flush in the floor to provide further flexibility in conveyor location and to do away with dangling cords.

Key equipment is a 4-ft.-square enclosed platform, or "pulpit," raised about 30 in. above the warehouse floor. Fronting it is a waist-high desk on which stands the loudspeaker microphone.

Pulpit faces a power-driven belt conveyor that extends about 60 ft. through the pick-line area. This carrier terminates about 10 ft. in front of the pulpit–and feeds to a 20 ft. secondary conveyor, set at right angles.

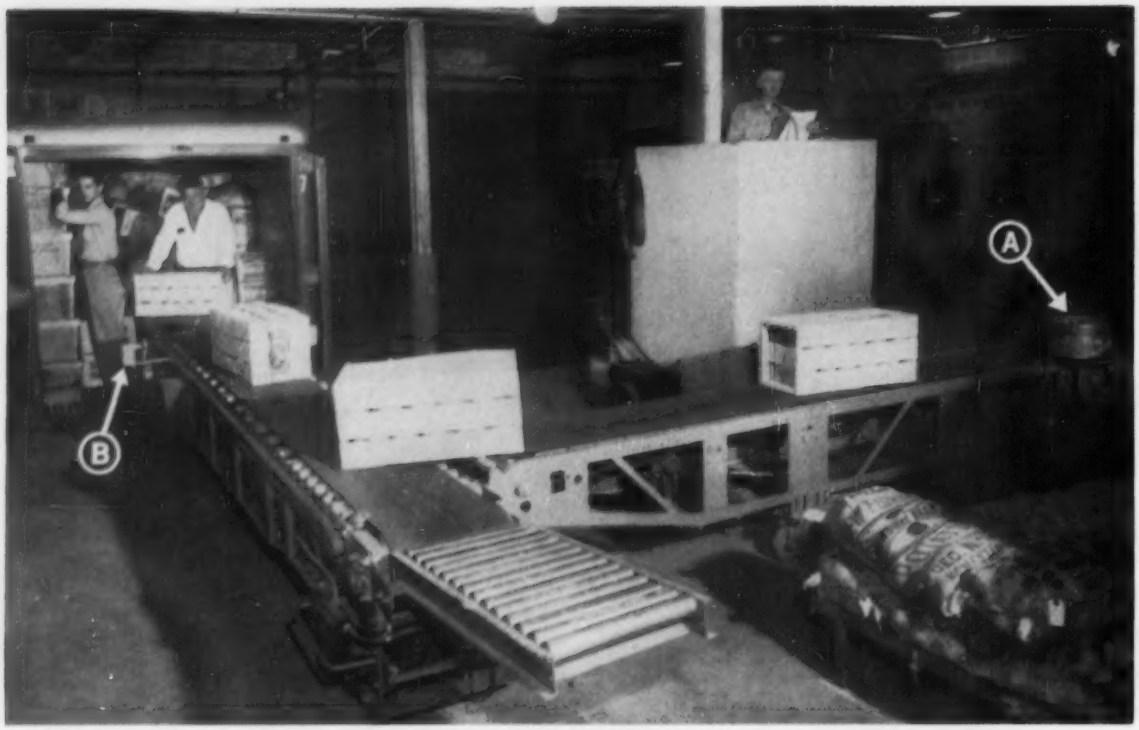
This second belt is reversible. And at each of its ends is located a power-driven belt conveyor having roller extensions at both ends. Mounted on wheels, the latter two units may be pushed directly into a truck body to start the loading, and then be withdrawn as loading proceeds.

Corner-Turning Devices

Goods passing down main conveyor are shunted to right or left on the reversible belt. Free-turning drums, fitted on each corner of the main conveyor, guide the cases or bags in their belt-to-belt transfer. Further, similar drums on the secondary conveyor then "turn" the items onto the portable belts.

Once item to be loaded is placed on main conveyor, it moves directly into the truck without further manual labor.

An electric-eye counter is rigged over each portable conveyor to pro-



. . . FINISH

Cases and bags whisk by conveyors to this truck-loading station. They're then "turned" from one belt to the next by drums—as at (A). Photo-eye (B) mechanically counts all items for double-check with invoice.

vide a mechanical count of pieces loaded into the truck. This gives a check against the invoices.

The photo-eye beam is limited to across-the-belt distance, thus reducing the chance of workers inadvertently breaking the beam and throwing off the count.

Pick Line Preparation

Produce trucks are loaded between 10 and 11 p.m. Prior to that time, all orders are in for next day's deliveries, and IBM invoices have been prepared. These latter are totalled to give required amounts of each item.

A loading crew, consisting of 6 men, assembles each item on separate skids and 4-wheel hand trucks, then moves them to the pick line. Here, various items are lined up along the main conveyor, leaving ample walking aisles between.

In the pulpit stands the loading foreman, arranging invoices by route and truck number, then stacking them in reverse order—so that goods to be delivered last are loaded first.

Four of the loading crew are assigned places alongside the main conveyor, while the other two men are stationed inside the truck to handle the loading.

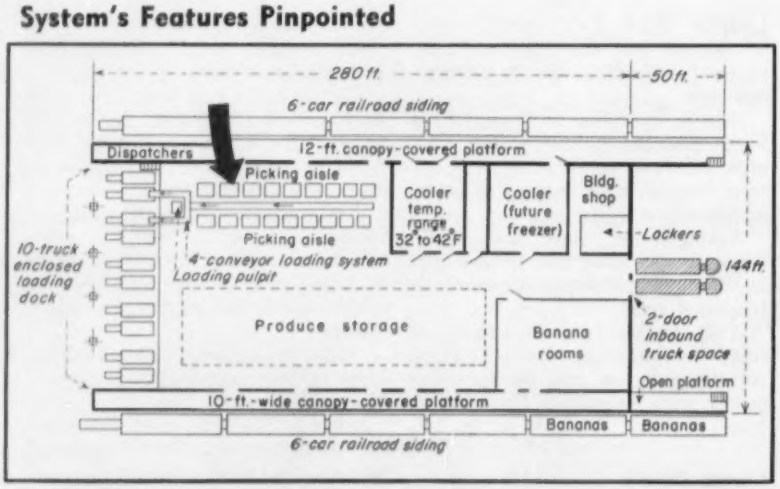
Over the loudspeaker, the foreman now calls out the items to be loaded. And as each item is called, the nearest loader picks it off the stockpile and places it on the conveyor belt.

To speed up loading operations, no tagging or other marking of the individual items is employed. On the delivery route, the truck driver is responsible for selection of proper items going to each store.

As truck routes increase in the future, available floor space will be used for installing a second set of main and secondary conveyors. Seen as a further aid to such expansion are the railroad switches and platforms located on either side of the building. This layout permits perishables to be moved directly from refrigerator cars to out-

(Turn to page 191)

System's Features Pinpointed



COMPACT "FORKED" loading system (arrow in this over-all layout) provides flexible flow to truck dock. Room is available for additional quick-load installation as business grows. Note dual RR sidings.

How to woo the diet shopper

She won't (or she can't) use sugar-sweetened products.

She knows SUCARYL; *she's used it in her home.*

She'll buy—actually shop for—your SUCARYL-*sweetened line.*

To this busy shopper, the promise of sweet, flavorful, low-calorie foods is a signal to buy —and to keep buying. Win her thanks *and* her business with your own SUCARYL-sweetened product.

SUCARYL is an entirely new substance, called Cyclamate. Its great advantage is a clean, sugar-like sweetness unmarred by the sharp, bitter aftertaste of other synthetic sweeteners. Also, it lends itself beautifully to your manufacturing processes.

Of course, you won't know this until you try it. And we would like to have you try SUCARYL—with our compliments—in your product. No obligation. Just tell us whether you prefer SUCARYL Sodium or SUCARYL Calcium, and write to: Chemical Sales Division, Abbott Laboratories, North Chicago, Illinois. Abbott

Stop her with

SUCARYL®

® Cyclamate, Abbott

The New Non-Caloric Sweetener

For more information, use coupon on last page.

This is Why the Nash is the Most Simple Compressor

It's the Nash!

There are no mechanical complications in a Nash Compressor. A single moving element, a round rotor, with shrouded blades, forming a series of buckets, revolves freely in an elliptical casing containing any low viscosity liquid. This liquid, carried with the rotor, follows the elliptical contour of the casing.

The moving liquid therefore recedes from the rotor buckets at the wide part of the ellipse, permitting the buckets to fill with gas from the stationary Inlet Ports. As the casing narrows, the liquid is forced back into the rotor buckets, compressing the gas, and delivering it through the fixed Outlet Ports.

Nash Compressors produce 75 lbs pressure in a single stage, with capacities to 6 million cu. ft. per day in a single structure. Since compression is secured by an entirely different principle, gas pumping problems difficult with ordinary pumps are often handled easily in a Nash.

Nash simplicity means low maintenance cost, with original pump performance constant over long periods Data on these pumps sent immediately on request

No internal wearing parts.

No valves, pistons, or vanes.

No internal lubrication.

Low maintenance cost.

Saves floor space.

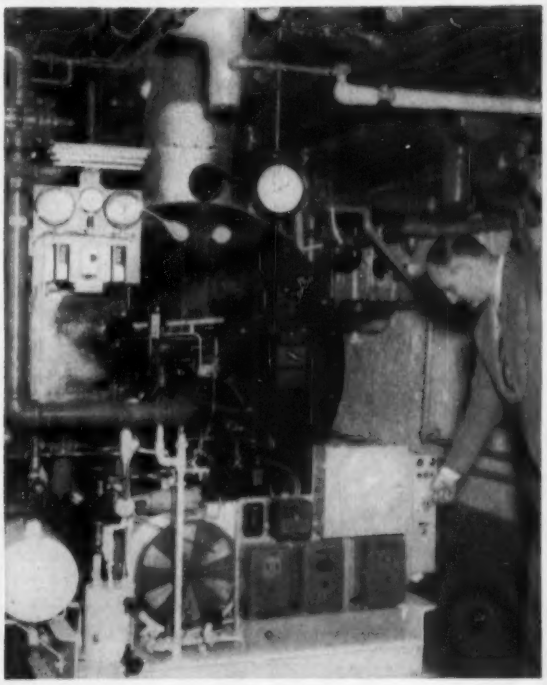
Desired delivery temperature automatically maintained.

Slugs of liquid entering pump will do no harm.

75 pounds in a single stage.

NASH ENGINEERING COMPANY
313 WILSON, SO. NORWALK, CONN.

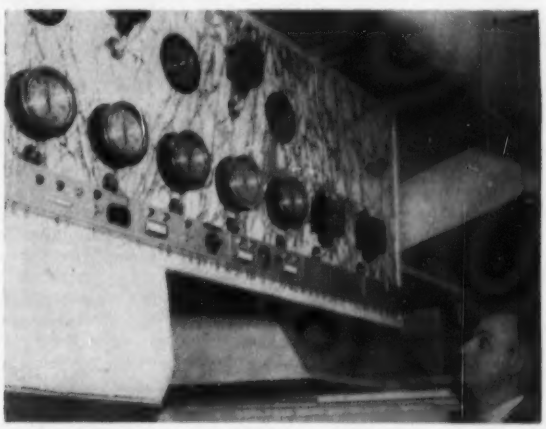
TIMER installed by author has been put to an eight-fold task at De Mets plant. Here, author checks device.



IT PROMPTLY starts this boiler at 6 a.m. as well as compressors, fans, etc., before workers arrive.

Automatic Timer Starts Up Plant

Putting second-hand $10 device to work, Chicago confectioner gets his key operating units running first thing in the morning . . . and without delays



SAFEGUARD is this signal panel that flashes pilot lights and rings an alarm bell when temperatures and pressures become too low or too high.

MINOS J. ASPROYERAKAS
Chief Engineer, De Mets, Inc, Chicago

The plant manager who says today, "I wish something could be done about getting our machines running on time every morning," is in a position to lick this problem easily and at little cost.

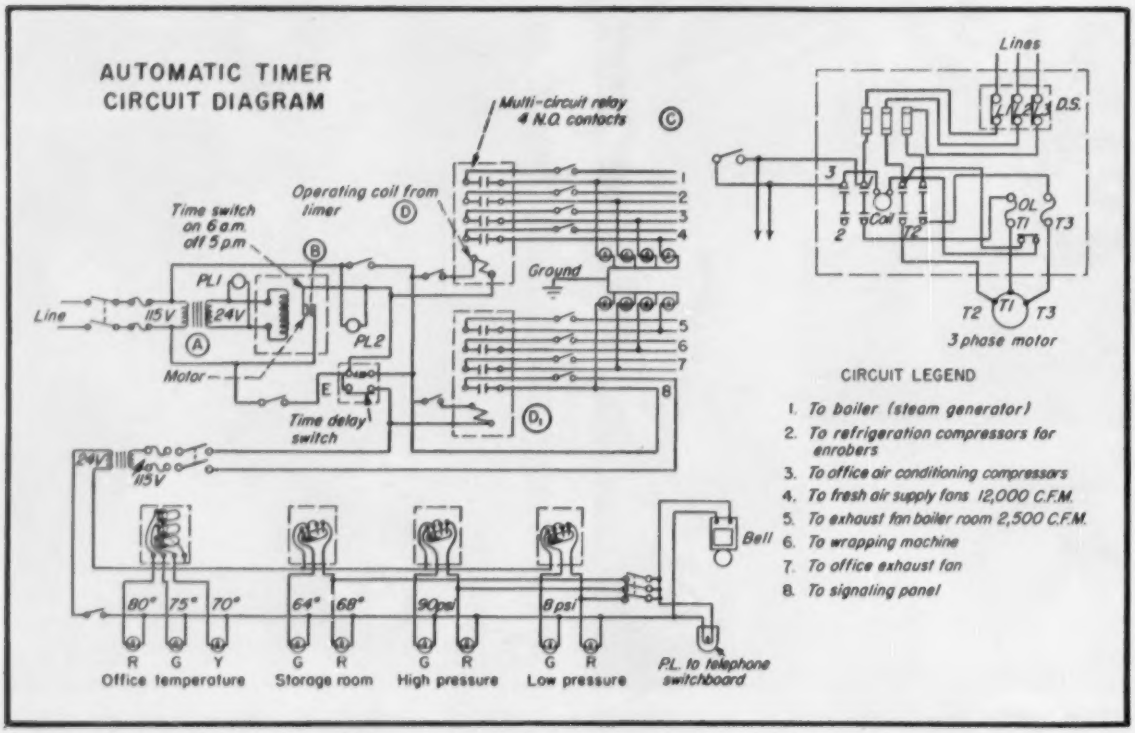
We, at De Mets, had this common problem. And we did something about it.

What we did was purchase a $10 timer from a government-surplus store, and then hook it up to an electric circuit so as to automatically start and stop our boiler, compressors, and fans, and to warm up heat-sealing plates on wrapping machines.

Main reason for this self-installed robot-timing system was to avoid morning start-up delays on production units requiring steam pressure. Too, we wanted to eliminate boiler damage from forced pressure build-ups. And, at the same time, we wanted to trim fuel costs by automatically stopping the steam generator *on time* at the end of the day.

Prompt starting and stopping of steam generator by a stationary engineer are not always possible. For he, perhaps through no fault of his own, might sometimes be ill or late for work. And when he is, he usually pushes up the steam pressure too quickly for the good of the boiler.

But soon after installing this simple timing system for our boiler, we found that it could be put to other production-boosting tasks — simultaneously starting and stopping fans and compressors, and heating the sealing plates on wrapping machines. And by stopping these units at the end of the day,



HOW SYSTEM WORKS: Electric current from a 115v. line is supplied to transformer (A) that steps it down to 25v. This low voltage line, hooked up to a red pilot light, indicates whether the timer is running. It also supplies current to the timer's motor to rotate the dial counterclockwise.

Timer is set to close contact of microswitch (B) at 6 a.m. and open it at 5 p.m. This switch then closes the electric circuit that energizes multi-circuit relays (C) with normally open contacts. With contact (B) closed, power (115v.) is supplied to operating coil (D), time-delay switch (E), and also to pilot light (indicating power is on).

Purpose of time-delay switch is to delay power to coil (D) so as to avoid instant starting of eight units (boiler, fans, compressors, etc.) connected to timer. This way, four of the units start operating immediately, then the others start after 30 sec. Each individual unit is equipped with a manual switch in case of failure of the timer.

Provided, also, is another manual switch to bypass the timer and energize both multi-circuit relays. As a safeguard against power failures, a special signal panel was installed next to timer. Power (115v.), in this case, is first supplied to a step-down transformer. This low-voltage current (24v.) then furnishes power to the signal panel, which is equipped with two temperature controls (for office and storage room) and two pressure controls (for high and low steam).

Office-temperature control is hooked up to three pilot lights—amber when temperature drops to 70 deg. F., red when it is up to 80 deg., and green between 70 and 80 deg. Storage-room temperature is set so that the red light flashes on and an alarm bell rings when the temperature rises to 68 deg. Normal temperature is below 68 deg., when the green light is on.

Pressure controls are pre-set to automatically ring the alarm bell and flash pilot lights from green to red whenever boiler pressures drop too low. As a further safeguard, sounding of the alarm flashes a red pilot light on the telephone switchboard to signal the operator. The operator then uses the paging system to get in touch with the stationary engineer.

we figure that we've been able to save considerably on fuel and electricity over the year.

Timer Does the Trick

Now, our timer automatically starts our combination oil- and gas-fired Cleaver-Brooks steam generator (80 hp.) burning on low fire ½ hr. before the plant begins operations. After 30 min. on low fire, steam pressure reaches the desired one-third of normal operating pressure and a maximum 250 deg. F. stack temperature. With the boiler warmed up, the stationary engineer then throws the steam-generator switch from low to high fire. Then there is sufficient heat to operate—and without delay—the cooking kettles, beaters, chocolate melters, and enrobers. At the same time steam generator starts operating, compressors (15 hp.) furnish refrigeration to chocolate-cooling tunnels and office air-conditioning unit, heat-sealing plates on wrapping machines warm up, fans (12,000 cfm.) supply fresh air to the factory, and exhaust fan (2,500 cfm.) pulls air out of the office and boiler room.

Our adjustable start-and-stop timer has movable "pins" that are set at 15-min. intervals along the periphery of a rotating dial.

In our plant's procedure, two pins—for the 6-a.m. start and 5:00-p.m. stop—are pushed farther out to the periphery of the dial. These pins then trip switches that start and stop the boiler, fans, compressors, etc.

All told, it is hard to imagine a plant addition handier than this little low-cost "robot." See diagram (above) for its working details.

What $10 "Engineer" Does

Before and at the end of each day's operations, it automatically starts and stops . . .

- **Steam generator.**
- **Refrigerator compressors for chocolate-cooling tunnels.**
- **Compressors for office air-conditioning unit.**
- **Fans supplying fresh air to factory.**
- **Exhaust fan in boiler room.**
- **Office exhaust fan.**
- **Current to heat-sealing plates on wrapping machines.**
- **Power to signal panel.**

FULTON SYLPHON

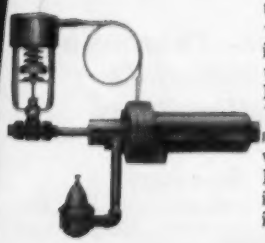
TEMPERATURE REGULATOR HEADQUARTERS, U.S.A.

Here are two more reasons why engineers looking for better ways to regulate temperatures . . . look first to Fulton Sylphon. These two new Mixers combine the most modern design with the time-tested Sylphon Bellows principle of control. Both types provide close, accurate control with an automatic shut-off safety feature. Quick, easy installation involves only pipe connections. Use the convenient coupon for detailed descriptions of these new Mixers.

HOT-COLD WATER MIXER—No. 1350 Series

Mixes hot and cold water to desired temperatures. Unaffected by variations in water pressure. Provides an accurate controlled source of tempered water for industrial, chemical and food process requirements, as well as wash basins, gang showers and similar installations.

STEAM-WATER MIXER—No. 1360 Series



Mixes steam with water to provide tempered water at low cost. Steam is injected directly into the water, utilizing every BTU of heat energy. Water is heated as used; steam is consumed only when water is drawn. Ideal for industrial, chemical and food processing systems using steam.

Mr. Controls

Robertshaw-Fulton

CONTROLS COMPANY

FULTON SYLPHON DIVISION

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Knoxville 1, Tennessee

Please send descriptive literature on:

- ☐ 1350 Series Hot-Cold Water Mixer
- ☐ 1360 Series Steam-Water Mixer

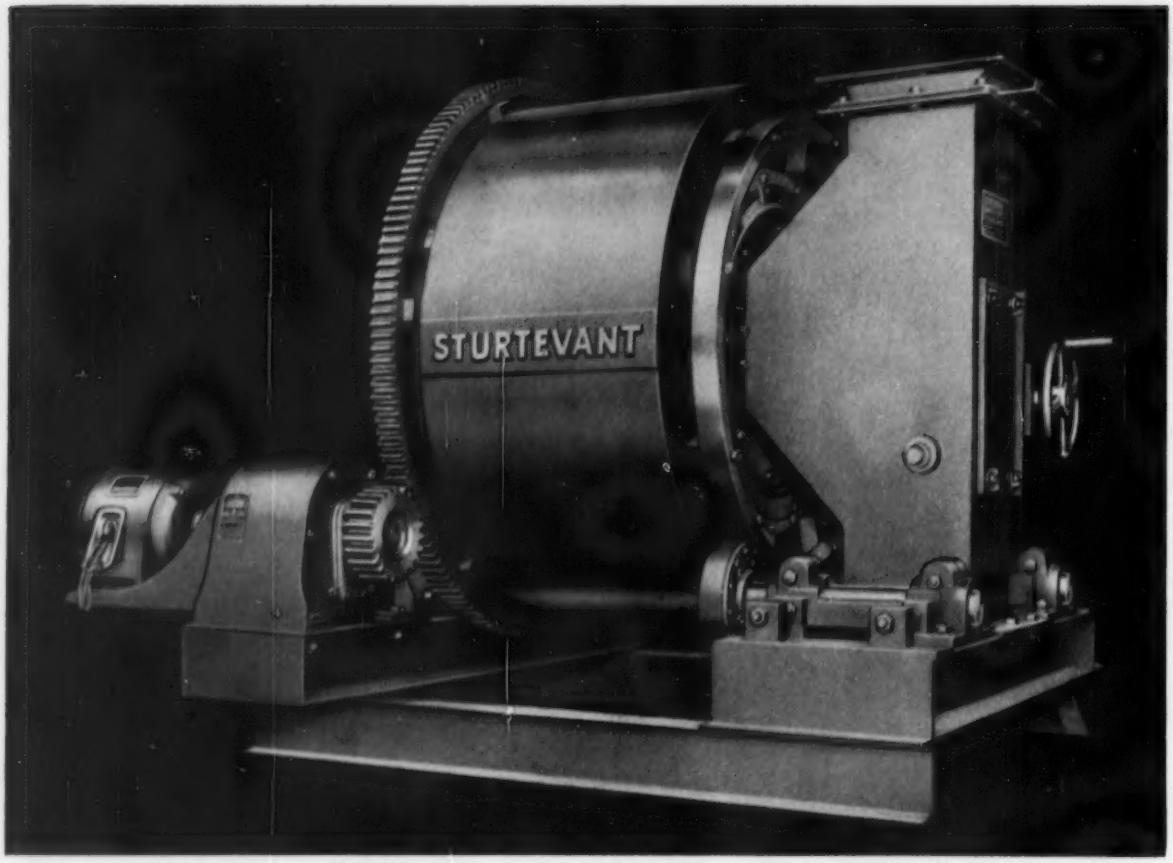
Name_____

Company_____

Address_____

City_____ State_____

For more information, use coupon on last page.



STURTEVANT *Dry-Batch* BLENDER

Provides Quick, Thorough Mixing of Materials ... Cuts Production Costs

Compare These Advantages

- Only one lever controls both receiving and discharging for simplicity of operation. Hand wheel operates rack and pinion slide at feed opening.
- 4-way mixing action speeds production . . . assures thorough blends.
- "Open-door" accessibility permits easy, fast, thorough cleaning.
- Single aperture drum for both intake and discharge.
- Unusually efficient scoops pick up materials to effect thorough mixing as drum revolves.
- 9 models . . . a size for every job . . . from 10 cu. ft. to 900 cu. ft. batches.

Sturtevant Dry-Batch Mixers are available in standard models with capacities from 500 to 20,000 lbs. Special models with higher capacities are also available. Write for information or engineering assistance.

Sturtevant Mill Company
106 Clayton Street, Boston 22, Mass.

DESIGNERS & MANUFACTURERS OF
CRUSHERS • GRINDERS • SEPARATORS • CONVEYORS
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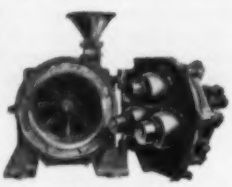
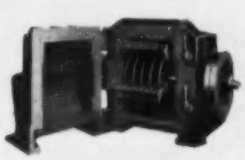
Other Sturtevant Equipment for Increasing Production

MICRONIZER® GRINDING MACHINE
A fluid jet grinding machine, the Sturtevant Micronizer speeds reduction of materials to low micron sizes. These jet mills are especially applicable in fields where a particle size in microns is desired. Available for outright sale.



RING-ROLL MILLS
For medium and fine reduction (10 to 200 mesh), hard or soft materials. Very durable, small power. Operated in closed circuit with Screen or Air Separator. Open door accessibility. Many sizes. No scrapers, plows, pushers, or shields.

AIR SEPARATOR
For separation of fines to 325 mesh and finer. Increases output from 25% to 300% . . . lowers power costs by 50%. Capacities ¼ to 50 tons per hour output.



SWING-SLEDGE MILLS
For coarse and medium reduction (down to 20 mesh). Open door accessibility. Soft, moderately hard, tough or fibrous substances. Built in several types and many sizes.

For more information, use coupon on last page.

Fast Freeze, Tight Pack

Guard Poultry Surface Color

Regardless of the scalding method, low-temperature freezing curbs darkening in broilers and turkeys. And a skin-tight, moisture-proof wrap retards freezer burn—especially with subscalded birds

W. B. ESSELEN, A. S. LEVINE, and I. J. PFLUG

First two authors are with University of Massachusetts Agricultural Experiment Station, Amherst. Third author, formerly with Station, is now with Agricultural Engineering Dept., Michigan State College, East Lansing.

Vital to sales appeal of frozen poultry is light surface color.

But this desirable quality quickly vanishes when the product is put through without due attention to specific factors of scalding, packaging, and freezing.

Particularly susceptible are birds defeathered by subscalding—a brief hot water dip at 138-140 F. immediately after killing. This technique is becoming increasingly popular with processors because it has proved more effective and economical in removing feathers than conventional semiscalding (a comparable dip at 125-130 F.)

But in contrast to semiscalding, the new method accentuates surface darkening of slow-frozen poultry, and also removes a natural moisture barrier that minimizes surface drying during freezing, storage, and thawing.

▶Now, however, research indicates that rapid freezing of birds in a tight-fitting, moisture-proof package protects the attractive light color, regardless of the scalding method. And further, this color is well retained in storage for eight months at — 10 F.

To determine the factors involved in poultry darkening, we investigated the effect of different freezing rates on surface color of semi- and subscalded broilers and turkeys. These were packaged in a skin-tight wrap, such as Cryovac (Dewey & Almy Chemical Co.), and in an unvacuumized film package, such as polyethylene.

Freezing Half Broilers

In preliminary tests, groups of 12-wk.-old white Leghorn broilers were semiscalded at 129 F. and subscalded at 139 F. Broilers were eviscerated hot, cut in half, and chilled.

Half birds were then variously packaged in Cryovac, vacuumized polyethylene and unvacuumized polyethylene. Also, some were left unpackaged. Samples representing each were then frozen at 0 F. in still air, — 10 F., and — 40 F. in an air blast.

Examination 24 hr. after freezing showed that birds frozen at — 40 F. had good surface color. Unpackaged poultry, particularly those which were subscalded, revealed marked surface frost and drying. Birds frozen at — 10 F. were a little darker than those at — 40 F., while samples at 0 F. were significantly darker than those frozen at — 10 F. and — 40 F.

Subscalded poultry were slightly darker in surface color than those which were semiscalded, although no marked difference attributable to packaging was observed. In general, they were not as attractive as the semiscalds. But these differences were less at lower freezing temperatures.

A second series of scalding, packaging, and freezing tests was carried out to check these results. Procedures were the same, except that a fourth freezing method (brine immersion at — 10 F.) was included.

Again, birds frozen at 0 F. were quite dark 24 hr. after freezing. They were progressively lighter as freezing temperature decreased to — 10 F. and — 40 F. Those frozen by brine immersion at — 10 F. were almost white.

No significant differences associated with type of package were observed, and little difference in color due to scalding method was apparent. However, any variations in appearance were in favor of the semiscalded birds.

To compare effects of scald and freezing temperature, and vacuumized vs. unvacuumized film packaging, tests were made with whole-ready-to-cook Rhode Island Red broilers and young white hen and tom turkeys (12-lb. weight class).

Broilers were semiscalded at 129 F. and subscalded at 139 F. Turkeys were semiscalded at 126 F. (30 sec.) and subscalded at 139 F. (20 sec.). Feathers were removed and birds were drawn and trimmed, chilled in cold water, and packaged.

Two kinds of packaging were used—Cryovac (vacuumized and shrunk) and polyethylene (not vacuumized). Packaged birds were frozen at 0 F. in still air, — 10 F., — 40 F. in air blast, and — 10 F. in brine.

As found in previous tests, birds frozen at 0 F. had the darkest surface color—in this case after 48 hr.—and were progressively lighter as freezing temperature decreased to — 10 F. and — 40 F. Subscalded poultry frozen at 0 F. and — 10 F. were darker than the semiscalds, particularly in the turkeys. And hen turkeys were a little lighter than tom turkeys—attributable to the hen's subsurface fat layer.

Birds packaged in unvacuumized film appeared slightly darker and less attractive than those in vacuumized and shrunk packaging. Ice crystal formation and surface drying, particularly noticeable with subscalded birds, were observed in poultry packaged in unvacuumized film.

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Above article is based on paper, "Effect of Freezing Method and Type of Packaging on the Color of Semiscalded and Subscalded Poultry," authorized as Contribution No. 991, University of Massachusetts Agricultural Experiment Station, Amherst.

In Behalf of Progress . . .

Revolution by Radiation is NOT Imminent

That a revolution in food preservation by ionizing irradiation is imminent has been predicted in published material widely circulated among business men.

This is far out of perspective with the facts.

Food can be sterilized by heavy radiation doses. It can be pasteurized with lesser dosage. Surface molding can be inhibited, and potatoes and onions kept from sprouting in storage by light doses.

Yet the practical feasibility of doing any of these things has yet to be demonstrated.

Irradiation's future is still very much in the hands of the researchers. When they settle on some application to their satisfaction, then it must face up to the hard facts of commercial production, distribution, and merchandising—not to mention consumer reaction.

While progress is being made, quality is a real stumbling block to sterilization by irradiation. Flavor, color, odor, or texture may be impaired.

Nutritional effects, too, will require a great deal more study. Work on this is under way in about a dozen laboratories. Results so far look encouraging. There is reason to believe that it will be entirely safe to eat irradiated foods, and that vitamin content and other nutritional values will not be impaired too seriously.

But it is going to take a lot of research, over a long period, to provide the Food & Drug Administration with the proof it needs to extend its approval.

One FDA spokesman puts the time at 5 to 15 years. Remember that the government will take no risks on the safety of food. And even some impairment of nutritional values may stay its OK.

Safety of the irradiation operation in food plants is another deterring factor. Machine irradiation is not very hazardous—yet its safety is not as foolproof as that of conventional processes.

Radioactive sources of radiation energy are much more of a safety problem, primarily because of the serious results of human error.

Cost of irradiation treatment must be proved quite low in commercial practice, too. A few extra pennies per case of food is something to be reckoned with in this highly competitive business.

Consumer reaction is all important. And it remains among the factors yet to be determined.

We believe that radiation will be applied to the preservation of food. But it will come in a limited way, slowly—starting in perhaps five years.

It will not be a major food processing method in the next decade. More likely it will be a supplementary tool for food processors to employ in special cases. And we're going to see canning, freezing and dehydration continue their rapid gains.

Watch progress made by the radiation researchers. Participate in that research, if you can. But don't be misled by premature pronouncements.

You Share Blame for Food Education Stymie

In May we pointed the finger at situations in universities and colleges which stymie progress in training technical people for the industry.

Now we present another side of the picture. And this one is laid in the laps of the men who direct the operations of our industry. The men who cry to the schools for help when they need a technical graduate.

In general, food manufacturers give the schools little encouragement to produce the kind of technical talent the industry needs in ever increasing qualities. And of the food firms which take a helpful interest in education, not very many provide the necessary tangible assistance in the form of financial grants, scholarships, research fellowships, research projects, or equipment.

Furthermore few companies are doing anything to interest young technically minded people in careers in the industry.

The need for positive and appreciable help is particularly urgent in the case of privately owned, endowed institutions. Here it may costs twice as much to educate a technical student as the student pays in tuition.

Even in state schools the tuition for out-of-state boys and girls usually pays but a fraction of the cost. Local taxpayers pick up the biggest part of the bill. So these schools will be just a little cautious with their progress in food education.

Perhaps the most educational help given by food companies is in the form of graduate fellowships and research in the bigger schools. But the struggling little technical food schools need help, too. And both big and little need assistance at the undergraduate level. Otherwise where do they get enough graduate students? And where do they get the finances to survive?

Food companies even seem to be asleep when it comes to taking advantage of special courses. One food school recently gave a course in instrumentation for the food industry, only to be dumbfounded that 90% of the enrollees came from the chemical industry.

Without the progress that can be created by technical talent, food companies face bankruptcy or merger.

Better help the educators to rescue your company from such inglorious ends.

In many plants, Celite diatomite filtration has helped process control men maintain the desired balance between clarity and flow rate.

CELITE FILTRATION assures perfect clarity at fastest flow rates

For maximum clarity, Celite* offers a filter cake hundreds of times finer than the finest wire mesh. *For maximum flow rate,* Celite offers more than 2,500,000 filter channels in every square inch of the filter cake's surface. Thus, you can maintain highest quality without handicapping your production schedule . . . expand production without creating a clarification bottleneck.

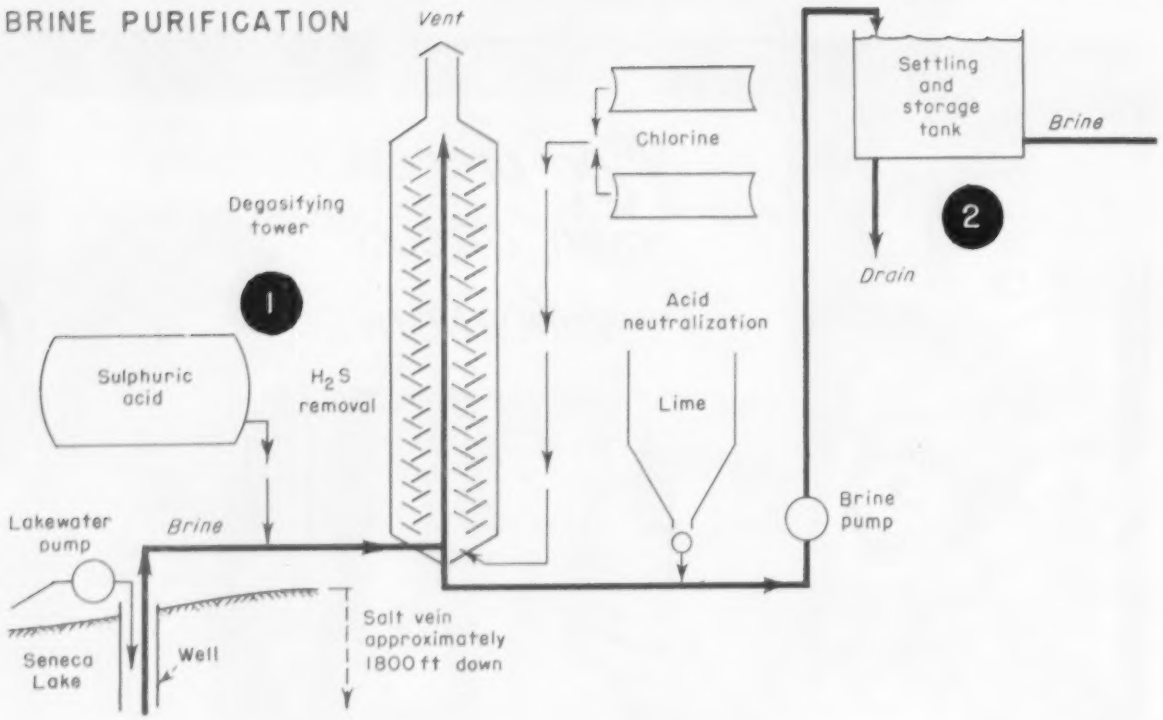
Celite is diatomite . . . works with almost automatic ease with any standard pressure filter. To meet your specific requirements, Celite comes in nine standard grades of microscopically controlled particle size.

Celite is in wide use today filtering sugar, beer, jellies, syrups, cooking fats and oils. If your product is in a liquid state at some stage of processing, perhaps Celite can help you solve the quality versus production problem. A Celite engineer can give you the answer fast.

To get in touch with a Celite engineer or obtain further information on Celite diatomite filtration, write Johns-Manville, Box 60, New York 16, N. Y. In Canada, Port Credit, Ont.

*Celite is Johns-Manville's registered trademark for its diatomaceous silica products.

Johns-Manville CELITE FILTER AIDS



Making High-Purity Salt

UNFOLD HERE

International's Glen Works does it the efficient way with latest type evaporators. Dual use of steam is big factor

ADVANCED ENGINEERING has made possible production of top quality salt at lowest cost at International Salt Co.'s Glen Works, Watkins Glen, N. Y.

Here a vein of salt averaging 100 ft. in thickness lies about ¼ mile under the surface. But this salt is not drymined. Instead, wells are drilled into the vein and water from adjoining Seneca Lake is pumped down to convert the salt to concentrated brine.

Then this brine is pumped from the wells, treated to remove certain impurities–Point (1) in flowsheet–and stored in large settling tanks (2). From here it flows to grainer pans for production of coarse grain salt, or to vacuum pans for manufacture of granulated salt.

For story behind this advanced operation see p. 72

Latter process is considerably more efficient and accounts for 85% of the plant's production. However, continued demand for the larger grains by makers of cheese, butter, sauerkraut, etc., makes continued operation of the grainer process imperative.

Vacuum Process

In the manufacture of granular salt, a large quadruple-effect evaporator is employed. Each of the four effects of this unit–Point (3)–is 65 ft. 9 in. high and of 15 ft. dia., with inclusion of an external tubular heater through which the brine is circulated at high speed.

Heater for 1st effect–Point (4)–is supplied with low-pressure (12 psi.) steam exhausted from turbo-generators in the engine room. The 2nd, 3rd, and 4th effect heaters use vapors from evaporating brine in the immediately preceding effects. Vapors from 4th effect are condensed in barometric leg (5) which is supplied with lake water at approximately 50 F.

Bottoms of evaporators are cone-shaped, with ends prolonged in elutriation legs (6), which collect salt crystals. They are transferred to setting tank (7), then pumped to a wash tank and cleaned with fresh brine. Slurry from this tank goes to top-feed rotary filters (8), where brine is removed and the salt dried by a blast of hot air. Then it is conveyed to a rotary cooler (9) and discharges with a moisture content of 0.03%.

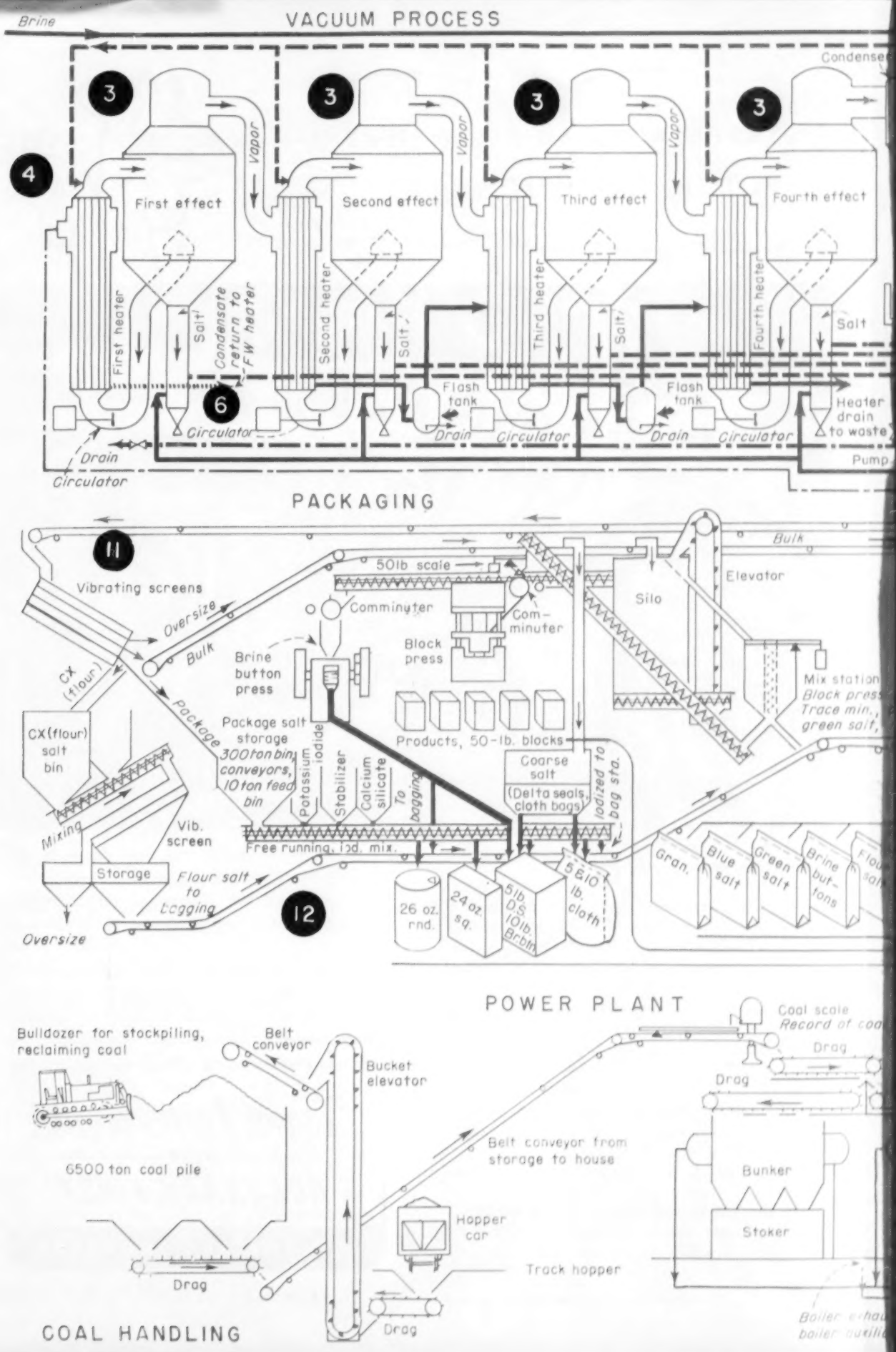
Dried salt is weighed and sampled continuously (10), then elevated to vibrating screens (11), and thus classified into lots of three sizes, each of which goes to packaging or to bulk storage. Feeders (12) add small amounts of other chemicals to the salt for special products.

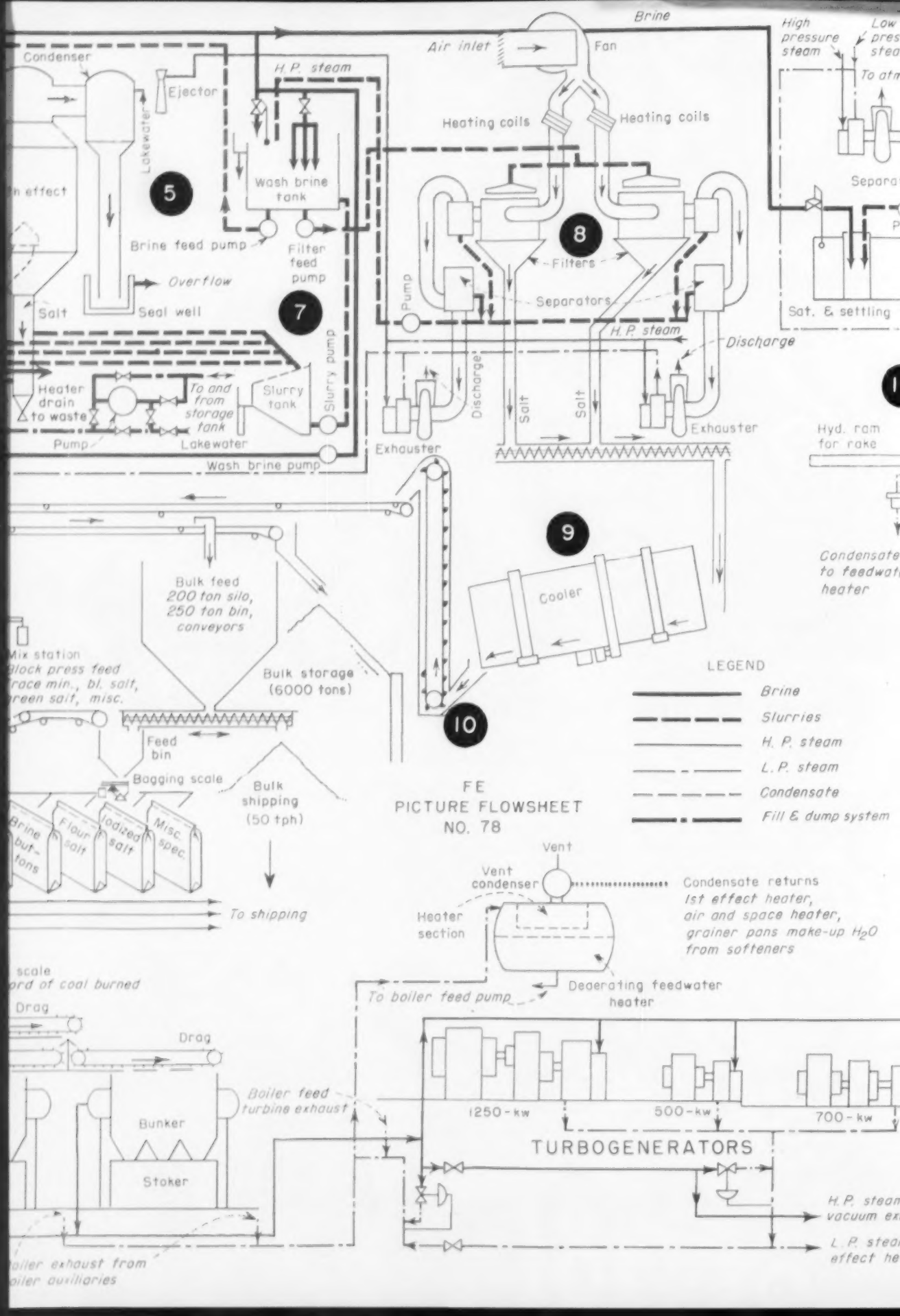
Grainer Process

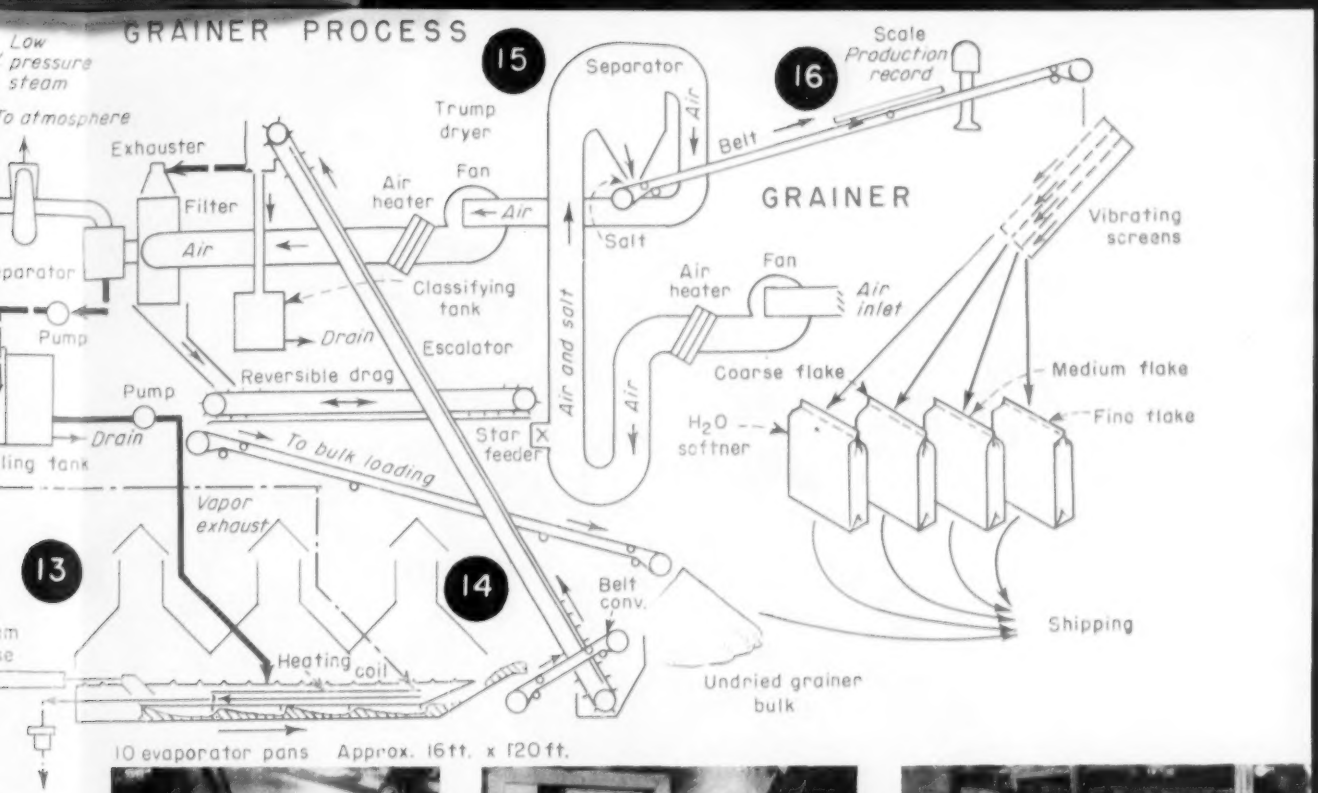
Coarse grain salt is made in flat, open-top pans 16x120x2 ft. deep (13). Each is equipped with submerged coils and reciprocating rakes that remove deposited salt.

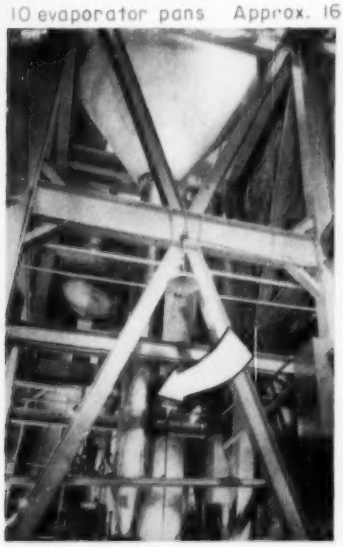
Brine is kept at 185 F., and slow evaporation of water from the surface causes salt crystals to form. They grow, then sink to the bottom and are raked over a drainboard to a conveyor belt that discharges to an escalator (14).

Crystals are elevated to a tank and washed with fresh, saturated brine. Slurry from here goes to top-feed rotary filters where separated crystals are partly dried by hot air. Bulk salt goes directly to storage. That to be packaged is further dried in a trump dryer (15), conveyed under magnets, continuously weighed (16), sized by vibrating screens, and bagged.

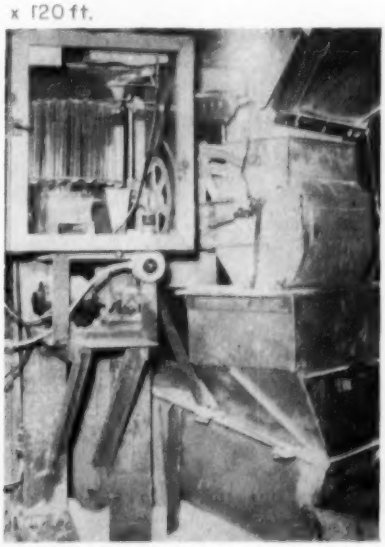

VACUUM PROCESS
Brine
3
4
First effect
Second effect
Third effect
Fourth effect
Vapor
Condensee
First heater
Second heater
Third heater
Fourth heater
Salt
Condensate return to FW heater
6
Circulator
Drain
Flash tank
Heater drain to waste
Pump
PACKAGING
11
Vibrating screens
Oversize
Bulk
50lb scale
Comminuter
Block press
Brine button press
Silo
Elevator
CX (flour)
Package
CX(flour) salt bin
Package salt storage 300 ton bin, conveyors, 10 ton feed bin
Potassium iodide
Stabilizer
Calcium silicate
To bagging
Products, 50-lb. blocks
Coarse salt
(Delta seals, cloth bags)
Iodized to bag sta.
Mix station
Block press
Trace min.,
green salt,
Mixing
Vib. screen
Storage
Free running, iod. mix.
Flour salt to bagging
12
Oversize
26 oz. rnd.
24 oz. sq.
5 lb. D.S. 10 lb. Brbn
5 & 10 lb. cloth
Gran.
Blue salt
Green salt
Brine but-tons
POWER PLANT
Bulldozer for stockpiling, reclaiming coal
Belt conveyor
Bucket elevator
Coal scale
Record of coa
Drag
Belt conveyor from storage to house
6500 ton coal pile
Hopper car
Track hopper
Bunker
Stoker
COAL HANDLING


Brine
Air inlet
Fan
Condenser
Ejector
H.P. steam
Lakewater
Heating coils
Heating coils
5
Wash brine tank
Brine feed pump
Filter feed pump
8
Filters
Overflow
Salt
Seal well
7
Pump
Separators
H.P. steam
Discharge
Slurry pump
Heater drain to waste
To and from storage tank
Slurry tank
Pump
Lakewater
Wash brine pump
Exhauster
Exhauster
Salt
Salt
Discharge
Sat. & settling
Hyd. ram for rake
9
Cooler
Bulk feed 200 ton silo, 250 ton bin, conveyors
Mix station
Bulk storage (6000 tons)
10
Feed bin
Bagging scale
Bulk shipping (50 tph)
Brine but-tons
Flour salt
Iodized salt
Misc. spec.
To shipping
LEGEND
Brine
Slurries
H. P. steam
L. P. steam
Condensate
Fill & dump system
FE
PICTURE FLOWSHEET
NO. 78
Vent
Vent condenser
Condensate returns 1st effect heater, air and space heater, grainer pans make-up H_2O from softeners
Heater section
To boiler feed pump
Deaerating feedwater heater
Drag
Drag
Bunker
Stoker
Boiler feed turbine exhaust
1250-kw
500-kw
700-kw
TURBOGENERATORS
H.P. steam vacuum ex
L.P. steam effect he

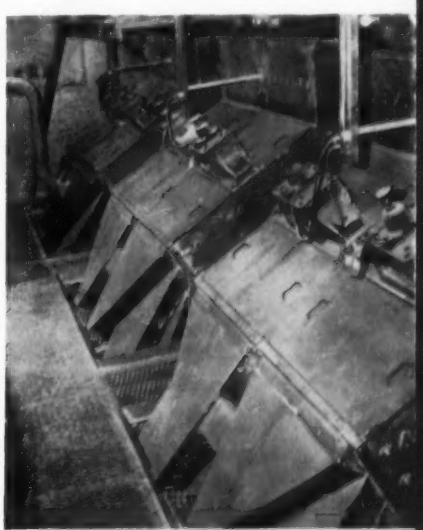




6 **ELUTRIATION** leg of huge evaporators (arrow) collects salt crystals.

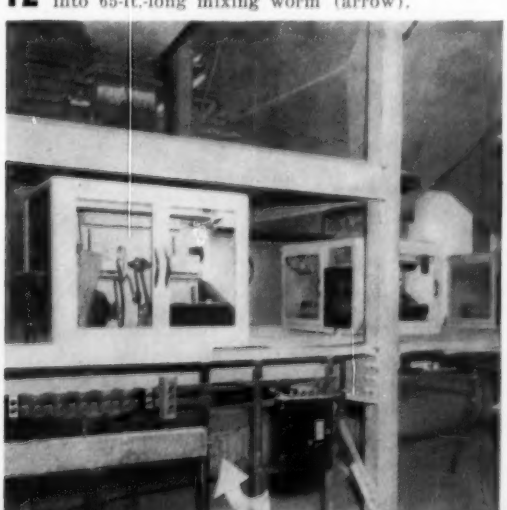


10 **BATCHING SCALE** (right) weighs, indicates dryer output. Unit (left) samples salt continuously.



11 **VIBRATING SCREENS** separate salt into four sizes for packaging or bulk.

12 **FEEDERS** proportion salt, special ingredients into 65-ft.-long mixing worm (arrow).



13 **GRAINER** pans produce large crystals by open evaporation. Note heating coils.

'Another Product Safely Shipped in Inland 'protection-eered' Containers"*

"POPSICLE" CONFECTIONS LEAD SUCH Sheltered, LIVES

"POPSICLE" confections never find out about the big, cruel, unsanitary world about them. From the spotless plant that makes their flavorings, to their delicious destiny on a consumer palate, "POPSICLE" confections are strictly pampered (as all good little food products should be).

It is only natural that the Joe Lowe Corporation, the originator and owner of the famous "POPSICLE" and other "SICLE" confections, should be particularly fussy about the pails they use to ship concentrated flavorings to licensees throughout the world. That's why it specifies Inland Steel *lined* containers. Inside each Inland 5-gallon pail are the makings of 10,000 mouth-watering frozen treats . . . cradled in a special lining that keeps them in blissful ignorance of nasty things like contamination. Even when a "POPSICLE" pail gets pounded, the container absorbs the shock and the contents stay pure and tasty.

The big-name brands know that pampering pays off for fine food products. And through the years they've entrusted their precious quality to Inland "protection-eered" containers. The full story, applied to your problems, is well worth writing for. Address our Mr. Robert Boecher, Room 244-D.

"POPSICLE" is the Registered Trade Mark of the Joe Lowe Corporation, New York, N.Y.

"It's Better to Ship in Steel"

**the right container, with the right lining for your product*

INLAND **INLAND STEEL CONTAINER COMPANY**

Division of Inland Steel Company
6532 South Menard Avenue • Chicago 38, Illinois
Plants: Chicago • Jersey City • New Orleans

Heavy fluids can't hinder working parts in these CRANE VALVES

THIS CASE HISTORY tells how the United States Playing Card Co., Cincinnati, solved—with Crane Diaphragm Valves—a costly problem of piping heavy enamels for paper coating.

The trouble was in the plug cocks and conventional gate valves formerly used in the enamel lines. During normal shutdowns the heavy liquid would build up on seating surfaces, in stem threads and working parts. The cocks and gates would "freeze up" . . . were hard to operate . . . couldn't be shut tight. The condition hampered production . . . made floors messy and dangerous . . . pushed maintenance costs sky-high.

Replacing with Crane Packless Diaphragm Valves stopped the trouble completely. Their sealed-to-fluid bonnet and pliable neoprene disc insert did the trick. After more than 4 years, all 48 Crane valves installed—with no maintenance whatsoever—are still seating tight . . . still operating freely and smoothly.

CRANE PACKLESS DIAPHRAGM VALVES

Working parts are safely out of contact with line fluid. The diaphragm seals the bonnet—that's all it does, giving it longer life. The independent disc with pliable insert seats tightly on foreign particles or seat deposits . . . and controls fluid, even should diaphragm fail. See your Crane Catalog or Crane Representative for wide selection of body, bonnet, and trim materials in these valves for countless uses.

CRANE CO.

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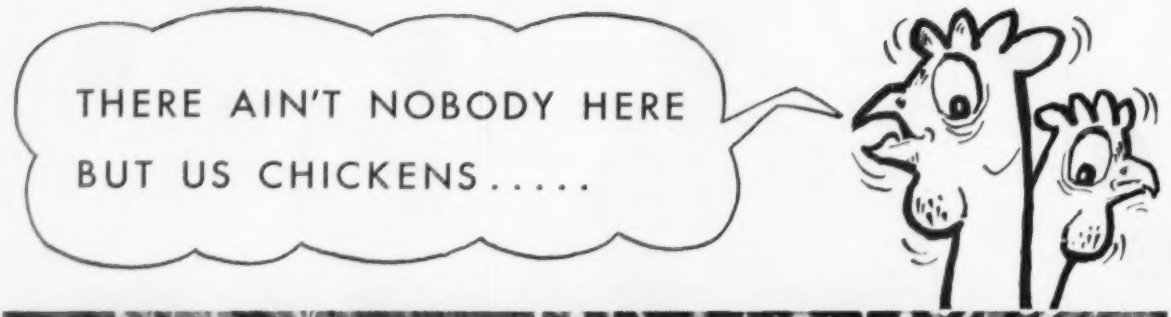

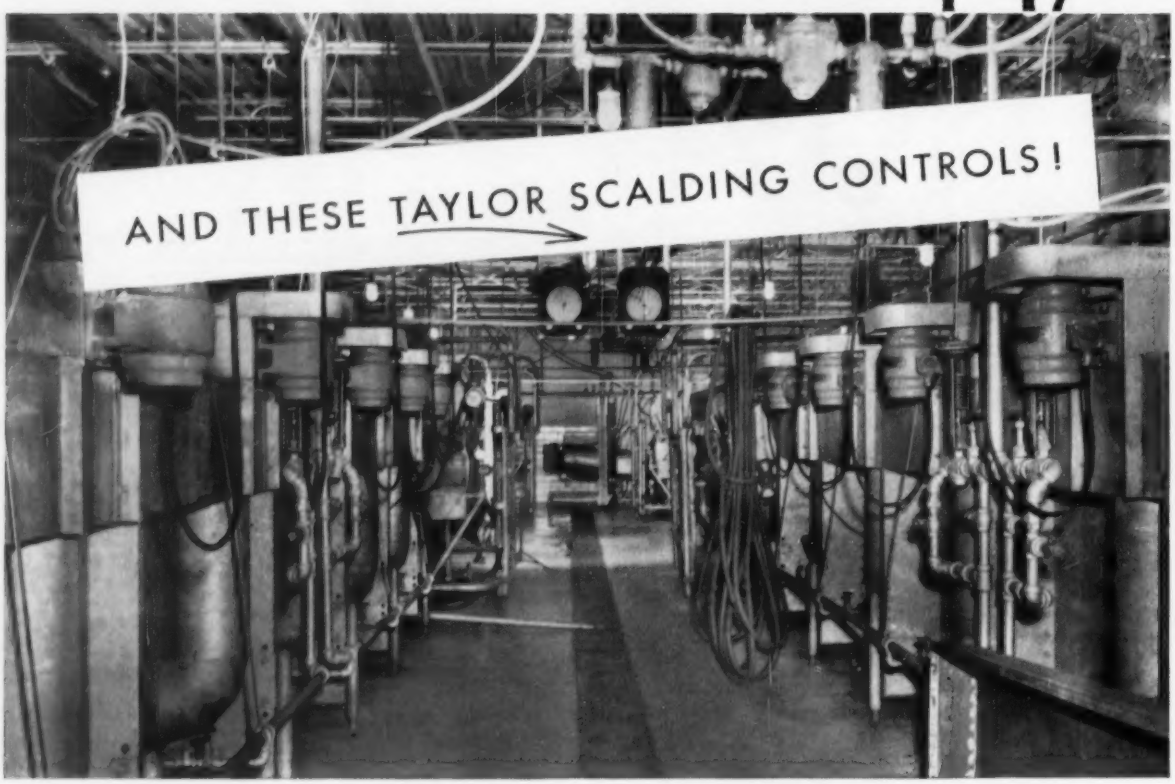

POULTRY SCALDING is delicate work. If the temperature in the scalding tanks isn't hot enough, the feathers won't be loosened enough for fast removal. If it's too hot, the skin will be discolored. That's why Esskay Company of Cordova, Maryland, uses Barker Poultry Equipment Co. scalders equipped with a Taylor Control System to give them uniform temperature throughout the tanks. A Taylor FULSCOPE* Recording Temperature Controller maintains precise temperatures in the first half of each tank and an Indicating Controller (not shown in photo) regulates the temperature at the other end. This system eliminates operator attention time and keeps steam consumption to a minimum. One quick glance at the controllers tells the operator everything's O.K. at Esskay.

You too can save time and money with Taylor instrumentation in every phase of meat processing. Ask your Taylor Field Engineer or write for **Catalog 500MP.** Taylor Instrument Companies, Rochester, N. Y., or Toronto, Canada.

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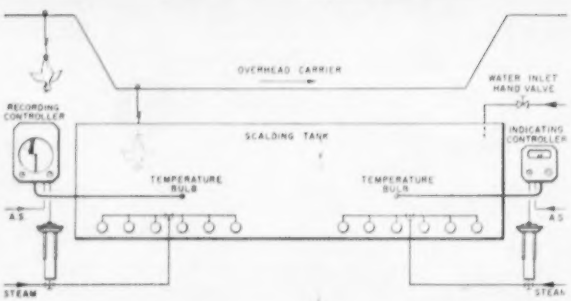

Taylor Instruments
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TO AMERICAN BUSINESS...

Thanks for Taming a Wild Horse

This is a message of appreciation to American industry. The occasion for the message is the completion of our eighth annual McGraw-Hill Survey of Business' Plans for New Plants and Equipment.

To a considerable degree, our appreciation is personal. It goes to the companies whose cooperation made our survey possible. Twice as many companies as in any previous McGraw-Hill annual survey carefully answered our questions about their plans to invest in new producing facilities. They gave a great deal of expensive time to the job. The cooperation of these companies, which employ nearly eight million workers, put the results of our survey on the firmest footing, in terms of coverage, it has ever had. For this cooperation we are most grateful.

But our appreciation is much more than personal. It extends in even greater degree to the kind of planning of investment in new plants and equipment which our survey revealed. The nature of this planning holds out promise that American industry is on the way toward bringing under control what historically has been one of the most upsetting forces in the American economy—the violent fluctuations in business capital investment. Progress in ironing out these fluctuations gives occasion for public gratitude.

A full report of the results of the eighth annual McGraw-Hill Survey of Business' Plans for New Plants and Equipment will be sent to anyone requesting it from the Department of Economics, McGraw-Hill Publishing Company, Inc., 330 West 42nd Street, New York 36, N. Y.

Very Good Business News

The part of our surveys that attracts the widest interest is the news they give about immediate business prospects. And this year the news is very good. The survey results indicate that American business as a whole plans to invest $29.5 billion in new plants and equipment this year. That is 5% more than was invested last year, and a new high for any year.

Plans for the years 1956-1958 are also remarkably encouraging in terms of the amount of investment in prospect. American business reports that it is already planning to spend within 3% as much for new plants and equipment in 1956 as in 1955. In the past, the expenditures planned for future years have always been sharply lower than those planned for the current year. This is understandable enough. It is sometimes impossible to anticipate all the expenditures that will be necessary a year or more hence. Thus the fact that plans are already made

to spend almost as much in 1956 as this year is very good news about business prospects. The level of investment now planned for the years 1957 and 1958 is also remarkably high—far higher than ever reported for years that far ahead in previous McGraw-Hill surveys.

Taking the Long View

The fact that these plans exist is of immense constructive significance. It clearly indicates that more and more, and now in dramatic degree, American business is taking the long view in making its plans for capital investment. It is developing a program which, if successfully carried out, will go far toward eliminating the habitual, destructive surging and sagging of what is in effect the central power house of our economic system—capital investment by business. Upon the level of this investment depends not only the general state of our prosperity but our progress in raising the American standard of living with new products and new and better industrial processes.

Seven years ago, when we first asked industry to estimate its capital spending beyond the current year, only a small minority of companies could give us any estimates at all. This year, 87% of the cooperating companies—and it was a far larger number of companies—could comply with our request for estimates for the years 1956-1958.

It Pays to Bet on Growth

A number of developments help explain the increase in long-range planning of capital investment. One is the increasing technical complexity of American industry. It often takes longer, in this complicated age, to work out a successful installation of new plants and equipment. Another reason for long-range planning is American business management's increasing conviction that it pays to bet on the demonstrated capacity of the American economy to grow over the long pull. With this goes a corresponding determination not to let short-term business fluctuations upset individual company plans for growth through addition of new plants and equipment. An additional factor, and one of great and increasing importance, is the sense of public responsibility on the part of American business leaders who want to help prevent destructive swings in the levels of new investment.

It cannot be too strongly emphasized that there is still nothing automatic about the carrying out of these long-range plans for business spending. Actual expenditures are still governed in major degree by the general health of our economy. This is fully attested by the fact that the current business recovery has led to a substantial upward revision of the investment plans reported to us last fall when we made a preliminary check of plans for 1955. Either private economic excesses or a reversal of the recent improvements in federal tax policy could gravely upset realization of present plans. Fortunately, neither of these possibilities seems to be an immediate threat.

The very fact, however, that American business management has made these plans and will do its utmost to carry them out is a development of tremendous constructive importance for the American economy. It means that major efforts are being made to tame what historically has been an economic wild horse—the process of capital investment by business. Both for doing it, and for telling us about it in our annual surveys, we extend to American industry our sincere thanks.

This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nationwide developments that are of particular concern to the business and professional community served by our industrial and technical publications.

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Donald C. McGraw

PRESIDENT

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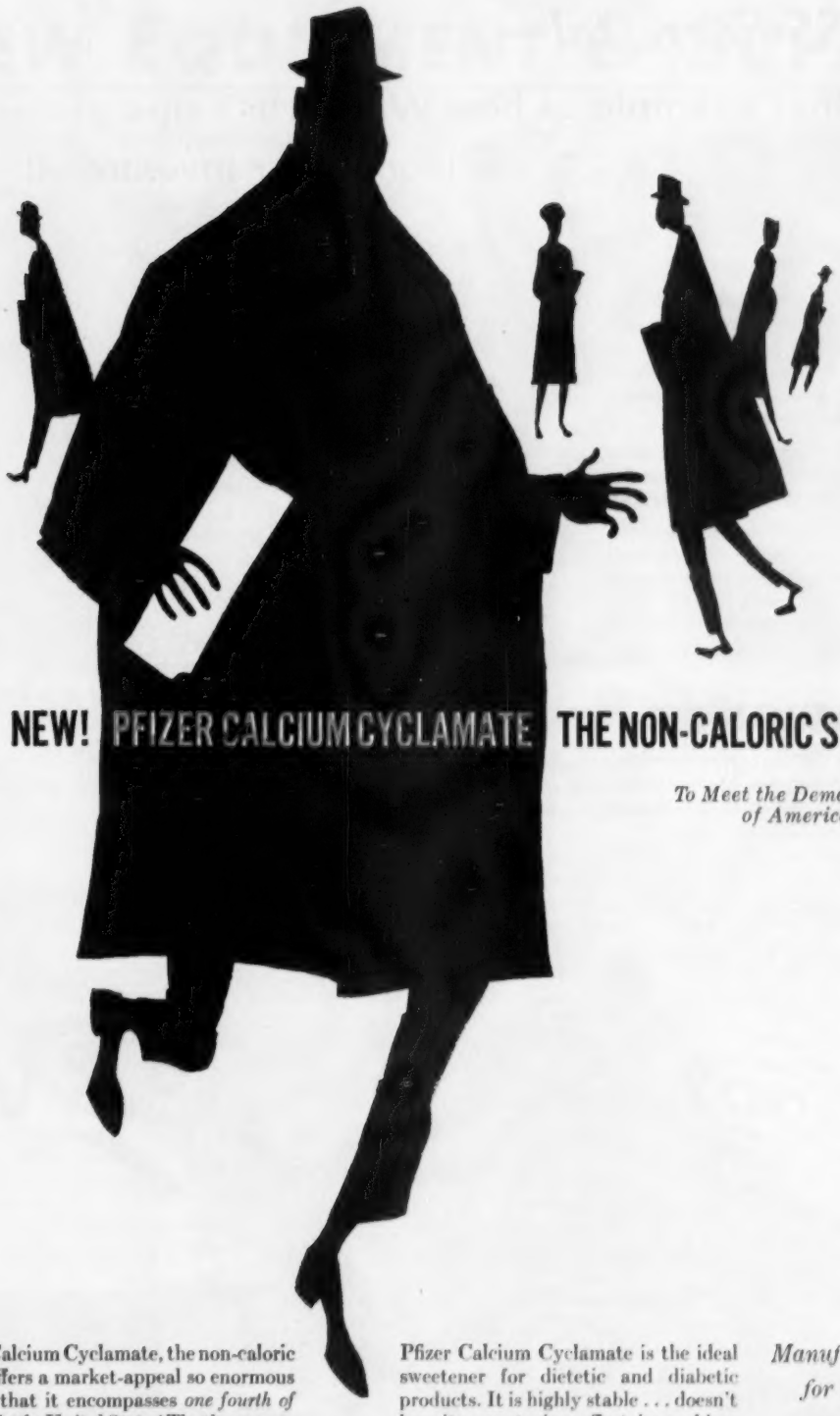

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Pfizer Calcium Cyclamate is the ideal sweetener for dietetic and diabetic products. It is highly stable . . . doesn't lose its sweetening effect in cooking, baking, canning or freezing. It is a safe, pure and sure sweetener, salt-free to meet strictest diet requirements. It does not impart a bitter off-taste or after-taste to your product, and it's compatible with all flavorings.

Look into Pfizer Calcium Cyclamate now. Contact Pfizer for full details, a working sample and counsel on your plans for launching a full scale or test-market product, aimed at those millions who count their calories!

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another example of how Walworth helps protect a 200 million dollar investment

Walworth products installed aboard the *USS Forrestal* include gate, globe, and lubricated plug valves and pipe fittings. They are used on high pressure air lines, fire mains, and most of the other piping systems throughout the ship.

Thousands of Walseal® Bronze Valves, Fittings, Flanges, and Unions comprise the major portion of the Walworth installations.

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Walworth Company of Canada, Ltd., Toronto

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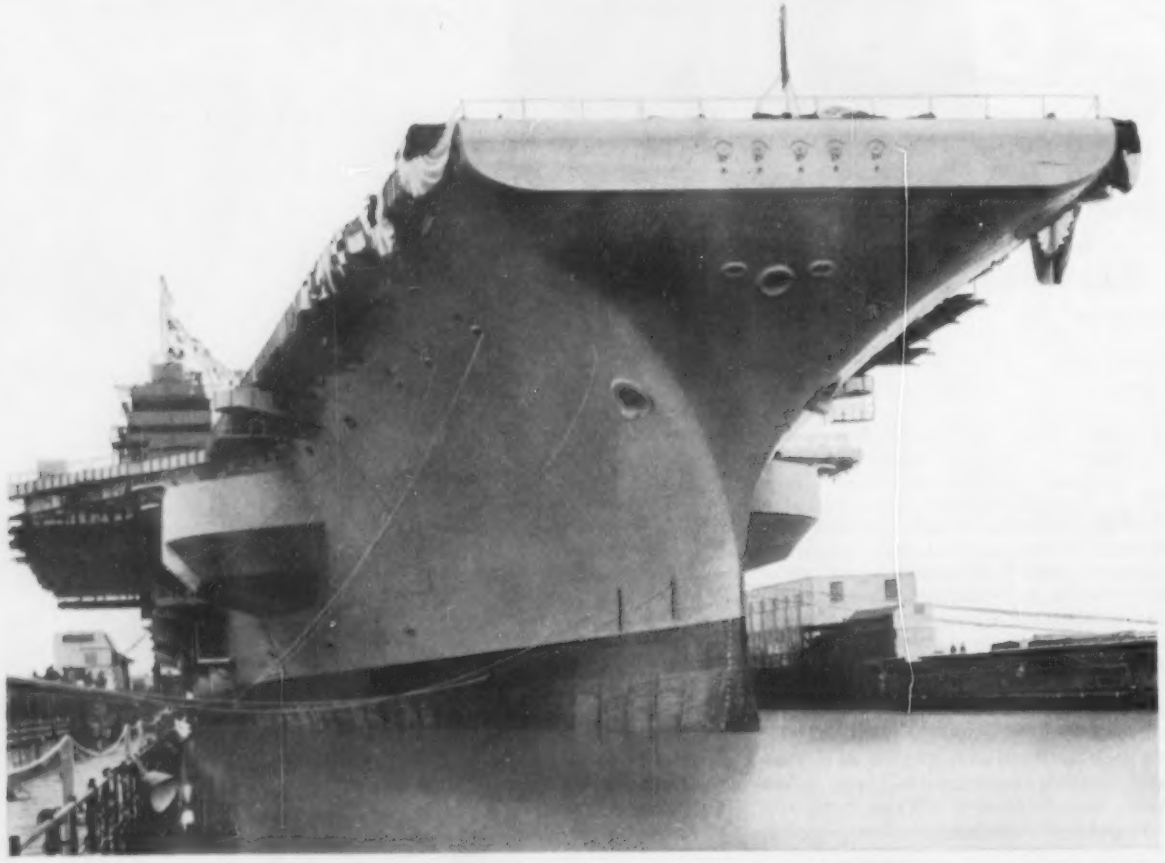
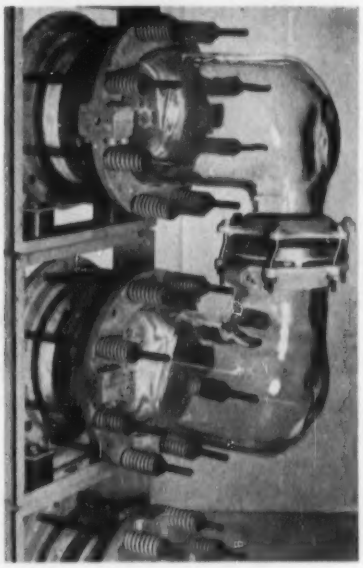
Walworth engineers worked with designers, metallurgists and builders of the mighty flat-top right from the blueprint stage. Their efforts assured the builder — Newport News Shipbuilding and Dry Dock Company — that *every* Walworth Valve and Fitting installed would meet *every* specification right down to the finest detail.

The *Forrestal* — like the *USS Nautilus*, the first nuclear-powered submarine — is another striking example of where Walworth engineering and products were called upon to protect a multimillion dollar investment.

Walworth, backed by 113 years of practical valve experience, is skilled in every type of installation. Whatever the industry, if your problem concerns valves or fittings, it will pay you to call on Walworth! Distributors in principal cities throughout the world.



NEW EQUIPMENT & SUPPLIES



Glass Heat-Exchanger Is Highly Corrosion Resistant

Although developed for heating and cooling of corrosive chemicals, this unit is also recommended for processing highly acid or metal-sensitive foods, such as vinegar, pickle brine, or wine.

To safeguard product purity, working parts of this 50-sq. ft. shell and tube exchanger are of glass (Pyrex)—termed virtually impervious to corrosion and contamination. Furthermore, its transparent tubing permits easy inspection of product and inner surfaces, while operator can see at a glance any buildup of scale or algae that cuts heat-transfer efficiency.

Cited as economical to install, operate, and maintain, unit also serves as a condenser with product fed into the tube side, jacket side, or both. Corrosion-resistance minimizes replacement part needs, and permits rapid changeover from one item to another. For many applications, exchanger may be cleaned in place with dilute hydrochloric acid.

Main body (photo, left) is standard 6-in glass pipe, while its 26 tubes are lengths of ¾-in. thin-wall tubing supported every six inches by baffle plates. Header assembly (right) of Teflon and high-alumina ceramic is held in place by a Monel ring, steel flanges, and springs coated with epoxy resin.

Space requirement is only 9 in. x 13½ in. x 12 ft. Modular sections can be mounted either horizontally or vertically in any combination of series and/or parallel flow. This provides for optimum heat transfer and pressure drop, while a wide variety of end fittings adapts the unit to any system.

Tubes have a conductivity coefficient (h) of 260 Btu./(hr.)(ft.²)(deg. F), and overall values (U) up to 195 have been reported in water-to-water tests. Straight-line flow and glass smoothness provide very low friction loss. Operating temperatures up to 375 F. are possible on the shell side, 200 F. on the tube side. Maximum pressure is 20 psi.

Because of its relatively light weight (165 lb. dry, 485 lb. flooded), two men can easily handle the exchanger without lifting equipment. Standard mounting brackets are adequate for normal operating conditions. Package unit is shipped from stock completely assembled and tested.

Maker also offers a 13½-sq. ft. exchanger that is similar to the larger unit.—*Corning Glass Works, Corning, N. Y.*

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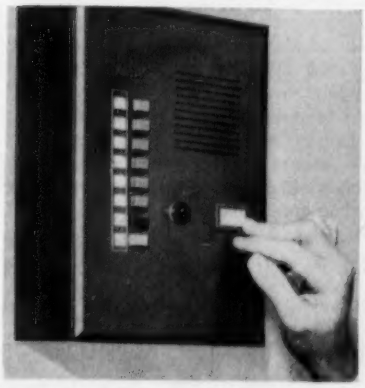

Plant Communication Sped With Push-Button Units

Wall-mounted master stations and economical single amplifier operation are advantages cited for this push-button, electronic communication system, known as "6000" Intercom. Stations may be located where no electrical outlets are available, since only a 30w. central amplifier requires power.

Each station may contact up to five other sites, and accept or reply to calls from any of them. Furthermore, replies can be made from across the room—a time-saving feature. Special buttons permit private conversations and paging, while stations can also be adapted for large production areas.

Units are available in two models: Flush-mount for recessing in wall, and surface-mount on existing walls. Dimensions are 8¼x11x3. Amplifier operates on 110-120v., 50-60 cycles a.c. only.

In addition, maker offers similar desk model units.—*Executone, Inc., 415 Lexington Ave., N. Y. C. 17.*

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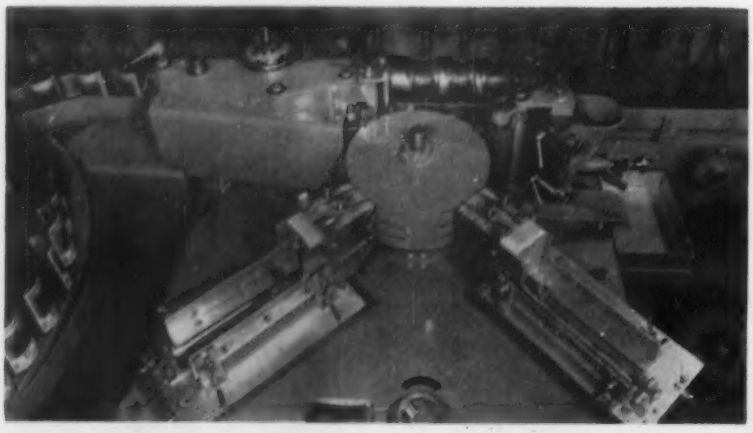

High-Speed Labeler Has Wide Operating Range

Rated at speeds up to 300 per min. on round bottles and jars, this labeler is designed to handle a wide range of container diameters and label sizes.

Shown above is the Lightning II, which offers an all-mechanical system with two label feeds. And a similar unit (Model I) with single label magazine operates at up to 150 per min.

Both standard models takes 2 to 4-in. dia. bottles, and labels 2¾ to 4¾-in. high, 1¾ to 5¼-in. wide, while special models with double glue pads handle smaller containers.

In operation, a helical intake feeds and spaces containers continuously as they travel straight through the machine on a platform chain conveyor. The rotating glue cylinder, fitted with segments, receives a uniform film of adhesive from a vertical glue roll. Labels are then taken from reciprocating magazines by glue-faced segments and transferred to containers by a rotating griper cylinder. After labels are applied, containers roll between forwarding belts and a rubber pressure pad for complete wiping action.—*Pneumatic Scale Corp., Quincy 71, Mass.*

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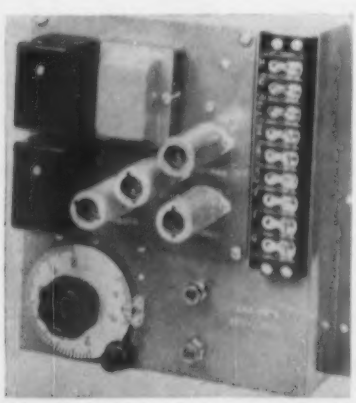

New Temperature Control Has High, Low Ranges

With this dual-range, electronic temperature control, the same refrigerator car may be used for either fresh or frozen foods.

Unit has an upper range of 20 to 70 F. for fresh produce and a lower range of −10 to +5 F. for frozen goods. Designed for accuracy under a variety of operating conditions, it's not affected by altitude, needs no compensation for ambient temperatures, uses no capillary tubes, and may be adapted to many types of refrigeration equipment.

System's upper range controls both heating and cooling by operating cooling relays when car temperatures climb above the pre-set control point, or by turning on electric heaters if temperatures drop. The lower range operates cooling equipment only, since heating is not needed for shipping frozen foods.

Both control-point ranges are calibrated in 1-deg. increments with easily read numerals, and a locking device on the dial prevents accidental resetting. Temperature sensing element consists of a coil of resistance wire. It has no moving parts and is designed to withstand vibration and shock.

A fail-safe feature turns off both heating and cooling equipment in the event of a failure. Previous mechanical controls provide either full heating or full cooling in case of a break in the capillary tubing or other system failure. But with both heating and cooling turned off, car insulation protects the load until failure is detected on remote-reading thermometers installed in each car.

Control takes nominal 230v., 60-cycle power, so it can be operated directly from the diesel generator which powers cooling compressors and electric heaters. This eliminates need for external transformers. Power consumption is 18w.—*Minneapolis-Honeywell Regulator Co., Wayne & Windrim Aves., Philadelphia 44.*

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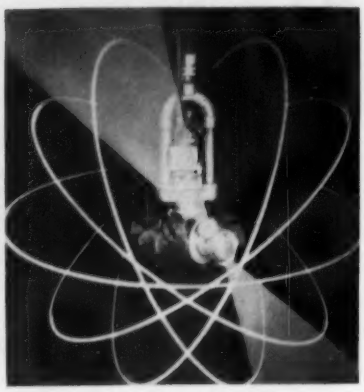

Hydraulic Scrubbing Jets Up Cleaning Efficiency

A new tank cleaner, providing 3-dimensional rotation of a high-pressure hydraulic jet, reportedly enables one man to do the job without assistance.

Designated as Rotor Jet, this compact, lightweight device delivers two powerful streams of hot or cold water, with or without detergents, over entire inside surface of any shaped tank. It is simply lowered through tank access by means of its supply hose. Since unit is completely controlled from outside, personnel need not enter tank.

Unlike conventional hand cleaning, mechanical movement of the jet is said to assure complete coverage. Cleaning speeds are fully adjustable—high speeds for light cleaning or rinse, and slow speeds for heavy cleaning to give longer hydraulic scrubbing and greater heat transfer to tank surfaces.

Powered by a venturi-injector, jets streams have a scrubbing rather than a cascading action. Furthermore, the jet head is powered pneumatically—all hydraulic power is used for cleaning, while none is lost to rotating power.

Unit is available in three models for discharge capacities from 600 to 6,000 gph.—*Sellers Injector Corp., 1601 L Hamilton St., Philadelphia 30.*

Circle 114C on Reader Service Card

Unique Fire Extinguisher Cuts Maintenance Costs

A 2½-gal. water-type fire extinguisher, operating on air pressure, eliminates costs of soda-acid recharge or CO_2 cartridge replacements, as well as those of annual inspections. Unit is simply recharged by replacing water and pressurizing with air.

Valve-controlled extinguisher (Elk-Air) is easily operated by pulling a pin, directing hose nozzle, and squeezing handle to release stream. Valve control permits stream to be turned on or off to conserve water and minimize water damage.

An easy-to-read pressure gage indicates if unit is ready for action. When arrow is in the green dial section, it is charged. But a reading in the red section shows need for recharging. No bumping or inverting is required, and it can be held or placed on floor to operate.

Unit delivers a steady stream 35 to 40 ft. long until water is exhausted, and carries Underwriters' approval for Class A-1 incipient fires—wood, cloth, paper, and rubbish.—*Elkhart Brass Mfg. Co., Elkhart, Ind.*

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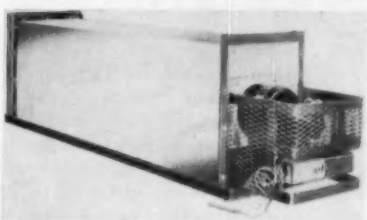

Wide Temperature Range Marks Dry-Ice Bunker

Seen cutting dry-ice requirements in truck refrigeration of both frozen and non-frozen perishables is an automatically controlled bunker that regulates temperature in the 0 to 70 F. range.

Called Frigi-Matic, it is termed easily installed and simply constructed. Main body has a 2-in. false bottom that acts as a refrigerating air duct. Its top plate is chilled by dry ice. A low-amperage fan forces air along the plate to lower its temperature, then circulates chilled air through the truck body.

Units vary from 50 to 200 lb. dry-ice capacity, and some are said to maintain refrigeration without re-icing for over 50 hr.—*Foster-Built Bunkers, 757 W. Polk St., Chicago 7.*

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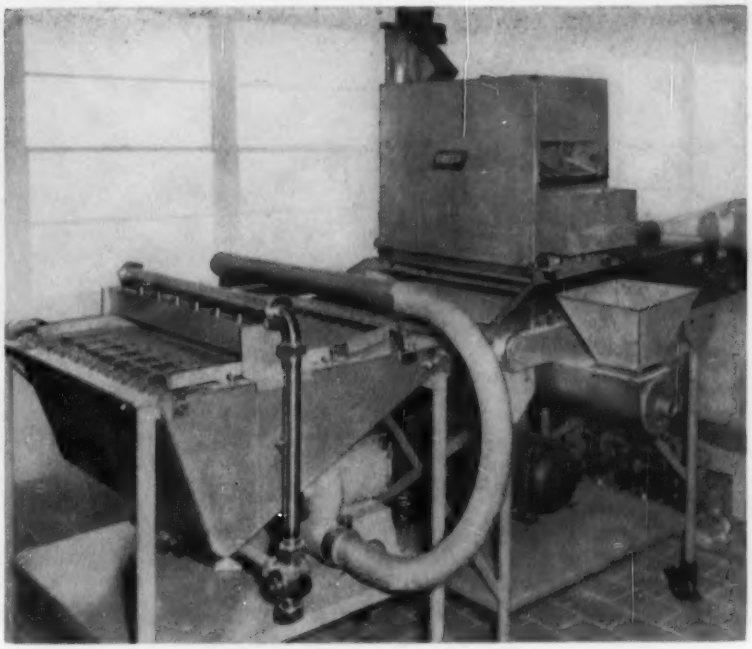

Automatic Breading Equipment Ups Quality Control

This dual unit (Fry-O-Pac), designed for quality-controlled battering and breading of meat, fish, and poultry, takes up to 2,000 lb. per hr. Products are kept spaced apart during entire operation to assure uniform coverage, eliminate labor of separating goods, and protect the coating.

As aligned items travel through batterer (left), they are covered by a puddle of batter on the belt plus that which is recirculated by pump. Product drains as it crosses transfer point to breader.

Here, tops and sides are evenly coated by a curtain of falling breading, while bottoms are covered by breading on the belt. A patting device gently presses breading into batter. Conveyor then turns product to shake off excess breading. It is now ready for frying or packaging.

Unit is 9 ft. long and handles all types of odd-shaped goods. Simple wingnut-thumbscrew disassembly permits quick and easy daily cleaning.—*J. W. Greer Co., Wilmington, Mass.*

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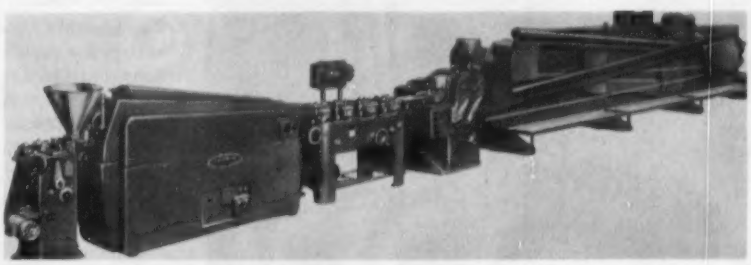


Flexible Confectionery Units Offer High Capacity

This redesigned line of candy-making equipment reportedly combines high capacity with versatility.

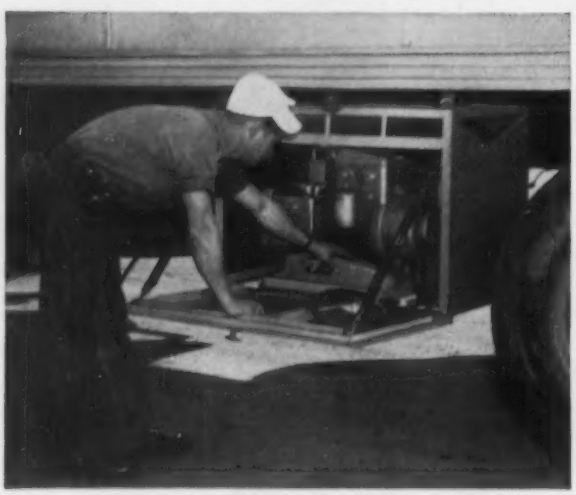
Components shown in operating position are, left to right: High-pressure center filler, batch roller, 4-roll rope sizer, plastic-sweets former, and multi-tier cooler.

Following advantages are cited for these units:

Completely enclosed batch roller has side panels that are quickly detachable for inspection and maintenance. Elevating gear is protected from dirt and sugar chips by bellow-type guard, and switch panel is waterproofed.

Plastic forming unit permits straight-line filling of very thin sugar rope. An electric-magnetic brake stops machine

Refrigerate trucks the really economical way... with the COLDMOBILE "CROSS-COUNTRY"



Exclusive design cuts operating and maintenance costs. The power unit mounts beneath the trailer...has flexible gas and electrical connections that permit the entire unit to be pulled out for easy accessibility.

Keep meat, poultry, dairy products—in fact, all perishables—fresh, whether on the road or at the dock, with the Coldmobile "CROSS-COUNTRY" (Model TR-15). The Coldmobile TR-15 saves money from the very beginning with a moderate initial cost. Its hermetically sealed design eliminates the need for belts, pulleys, jackshafts, clutches or unloading valves. The refrigeration unit mounts on the front wall of the trailer... doesn't waste cargo space.

Dependable Refrigeration When Parking. It's a simple matter for the driver to throw a switch connecting the refrigeration unit with the engine generator and press the starter button for sure, immediate starting. Or the generator can be switched off, permitting the refrigeration unit to operate on "plug-in" power.

Automatic Defrosting and Automatic Temperature Control. With the Coldmobile TR-15 the driver is assured of steady, efficient cooling at all times. There's no need to check the temperature, or take time to defrost the unit.

On-the-job performance proves the Coldmobile TR-15 provides new low-cost protection for interstate or cross-country hauling. For complete information, write—

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when candy sticks to the die and passes the stripper—an important feature with soft-centered sweets. A quick-release lever enables operator to withdraw pressure from plungers if a weak portion of filled rope enters the die head.

For faster die-head changing, a specially designed truck permits removal through side of machine without lifting the die. A hinged head gives full access to the die and a hydraulic control closes the head, thus preventing damage to the die. Furthermore, machine has variable-speed control from ¾ to full speed.

In the multi-tier cooler, aerodynamic design reduces cooling time to 4½ min. by efficient use of air blast. In addition to speedier cooling, this unit is said to require minimum floor space. Its short wire-mesh bands track easily, while the nine separate conveyor bands are interchangeable and can be easily removed for cleaning.

Equipment is made in England by Forgrove and Baker Perkins, Ltd., and is distributed in North America by—*Package Machinery Co., East Longmeadow, Mass.*

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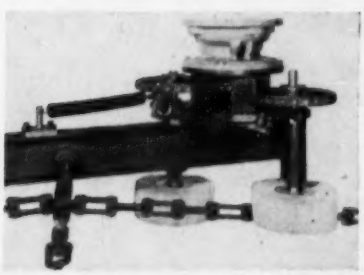

Brush Unit Cleans Conveyor Chains

Dust and dirt, which stick to lubricating oil on hard-to-reach overhead conveyor chains, is said to be automatically eliminated by this brush system.

Called Conveyor Chain Brusher, unit is mounted on monorail supporting the conveyor. Two brushes, powered by a 1 hp. motor, pivot on the motor base and bear against conveyor chain. These can be swung away from the chain if only periodic cleaning is desired.

Typical brush materials are Tampico fiber, nylon or crimp-steel wire. The fill is driven by a heavy wire staple through a continuous steel channel.—*Fuller Brush Co., Machine Div., Hartford 2, Conn.*

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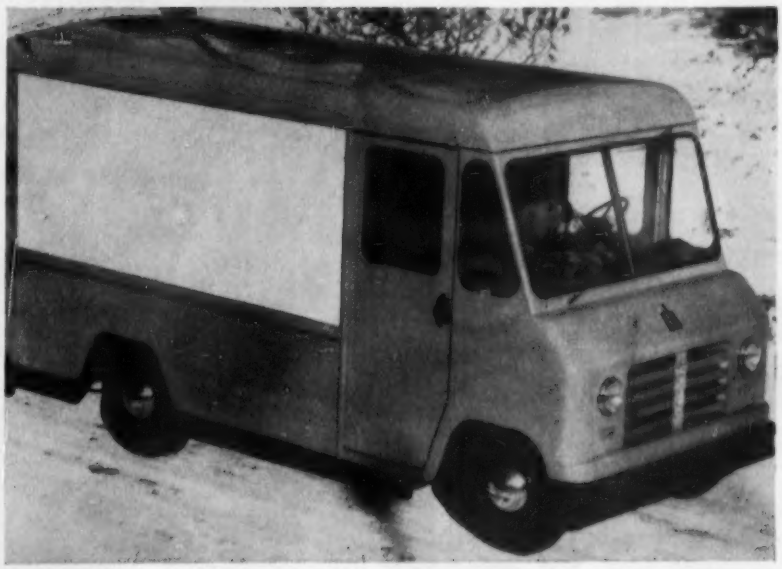


Lightweight Truck Body Has Increased Capacity

For multi-stop retail delivery operations, this truck offers a new lightweight body (Metro-Lite) of increased capacity.

Body is a composite of lightweight materials—fiberglass reinforced plastic, aluminum alloy, and magnesium alloy. Combined body-chassis weight is about 15½% less than a vehicle with similar chassis that mounts an all-steel body. Because of its construction, the 10½-ft. unit (photo) has more than 15% greater capacity than a similar all-steel flatback body. Extra capacity results from absence of conventional inner body lining.

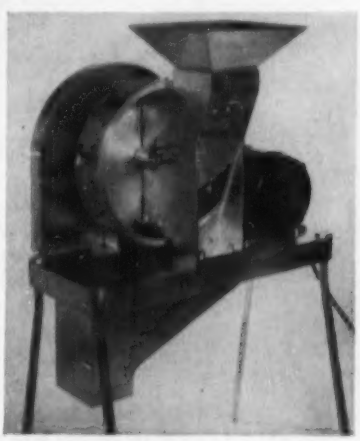
Important from a maintenance standpoint, all alloys used in manufacture are given special protective treatment. It is said that they will stand up indefinitely under severest weather and service conditions.

Aluminum alloy is used in driver compartment floor, body floor side panels and wheelhousings, center roof section, roof liner and cross bows, sliding front doors, rear doors, rear quarter panels, and front section housing grille. Roof insulation is 1-in. glass fiber pad, and grille is of stainless steel bars.

Magnesium alloy sheet is used for the ⅛-in. side and floor center panels. Side roof panels, rub rails, front door posts, and floor cross sills are magnesium extrusions. Plastic is employed in front and rear roof caps, front quarter panels, and windshield window frame. Operator has unobstructed vision through six large safety glass areas.

Trucks will be available in lengths of 9½ ft., 10½ ft., and 12 ft. 7 in., and with body capacities of 349, 387, and 465 cu. ft., respectively. Gross vehicle weights range from 5,400 to 16,000 lb., and wheelbases are 115, 122, and 137¾ in.—*Metropolitan Body Company, Bridgeport, Conn.*

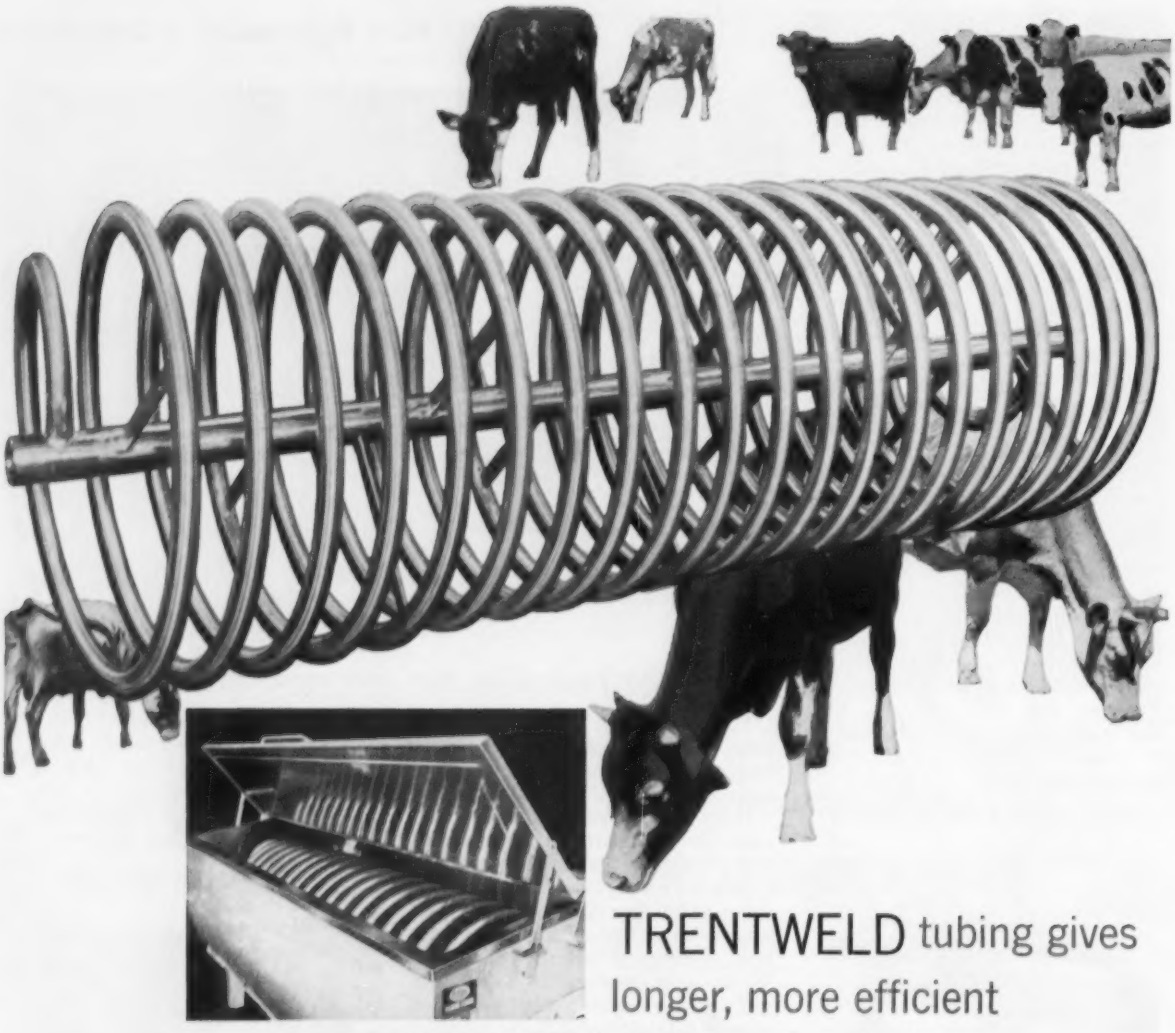
Circle 117B on Reader Service Card



Efficient Rotary Nut Slicer Has Product Versatility

Eight blades, adjustable for slice-thickness control, are mounted on this unit's rotary drum to handle a wide variety of nuts, seeds, cocoanut, and copra. Production varies from 350 to 1,250 lb. per hr., and slices may be from paper-thin to ½-in. thick.

Known as "Roto-Drum", machine is gravity fed and designed to operate with minimum frictional heat, thereby preventing oil extraction. Blades may



TRENTWELD tubing gives longer, more efficient operation in OVL-KOIL pasteurizer

The unique OVL-KOIL pasteurizer coil illustrated, is made of TRENTWELD stainless tubing. By forming the coil in an oval shape General Dairy Equipment, Inc., increased its length 10% without any increase in pasteurizer size or sacrifice of space between loops.

This extra coil area speeds up the pasteurization process, increases the efficiency of heating and cooling mediums, and gives greater heat transfer efficiency.

But this is just one of thousands of applications where TRENTWELD tubing has helped make products last longer and operate more efficiently. When you have an application calling for stainless or high-alloy tubing it will pay you to look to TRENTWELD. Trent offers the widest range of tubing sizes and finishes in the industry . . . in standard sizes from ⅛" to 40" O.D. – larger sizes on special order. And remember, you just can't buy better tubing than TRENTWELD.

TRENTWELD

STAINLESS STEEL TUBING

TRENT TUBE COMPANY, GENERAL SALES OFFICES, EAST TROY, WISCONSIN (Subsidiary of CRUCIBLE STEEL COMPANY OF AMERICA)

be changed while load is in the slicer and are not affected by shells accidentally added.

Unit occupies 2x2x3 ft. (without legs) and weighs about 250 lb. with 1½ hp. motor. Design simplicity is said to afford easy cleaning and low maintenance.—*Desert Sun Dry Fruit Co., 240 Drumm St., San Francisco 11.*

Circle 117C on Reader Service Card

Miniature Volt-Ammeter Employs Single Scale

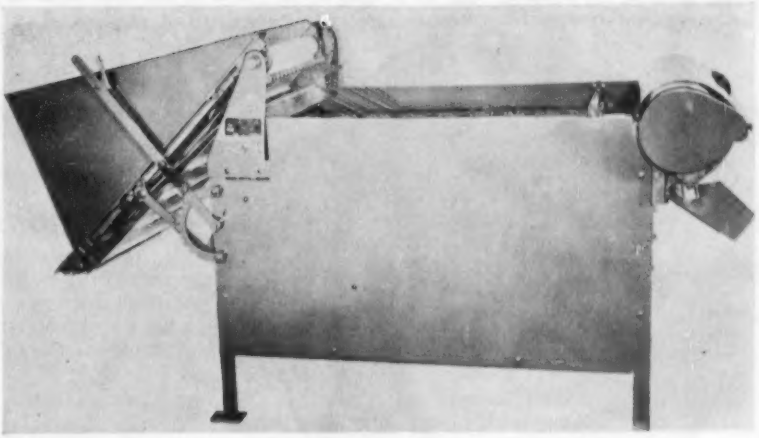
This light-weight, pocket-size clamp volt-ammeter (a.c.) is designed to speed and simplify electrical testing.

A single scale is used for all ranges and functions, which are selected through a convenient thumb switch. Neoprene-covered clamping jaws are tapered for measurements in limited areas, and have precision ground faces for positive contact. Only slight pressure on the gradient-controlled spring tripper is required for opening and closing.

Known as Model 749, unit's self-shielded mechanism with spring-backed jewels is shock-mounted in a bakelite case to safeguard accuracy in extended service.

Instrument accomodates conductors up to 1-in. round or 1¾ x ⅜-in rectangular. Six current ranges (300/150/60 30/15/6 amp.) and three voltage ranges (600/300/150v.) are provided. —*Weston Electrical Instrument Corp. 614 Frelinghuysen Ave., Newark 5, N. J.*

Circle 119A on Reader Service Card



High-Capacity Bean Slicer Minimizes Jamming

Automatic operation resulting in 300% greater capacity—4 tons per hr. for blanched beans, 3½ tons per hr. on raw beans—is reported to this redesigned French-Style bean slicer, called Hi-Speed.

Its new design provides faster and more efficient bean alignment, and virtually eliminates product jamming. Machine can be adjusted to meet demands of line load by varying elevation of feed hopper and incline of aligning bed. Other principal components are counter-revolving spiral rods and a bank of revolving circular knives.

In operation, either raw or blanched beans are automatically fed into hopper which is set at a predetermined height. A continuous-cleated belt then carries them from hopper to aligning bed. Beans are guided by inclined rods at feed end.

Rods further align product as it moves toward high-speed knives. Beans are held in position by stationary grids under the rods until they contact knives at discharge end, where they are sliced to about ⅝-in. thickness.

Overall length of unit is 8½ ft., width 3½ ft., and maximum height (adjustable hopper included) 3 ft. 7 in.—*Food Machinery & Chemical Corp., Hoopeston, Ill.*

Circle 119B on Reader Service Card

Single Telescoping Mast Marks New Lift Truck

To increase operator's visibility, this 4,000-lb. capacity lift truck (Monomast) employs a single mast consisting of two box-type sections, one telescoping within the other. Additional advantages cited are faster maneuverability and approach, more accurate load placing, and safer load handling.

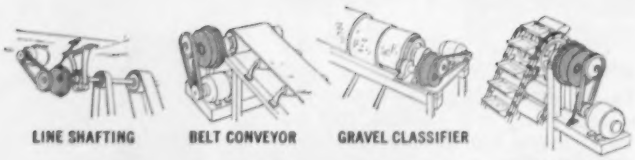
Total weight of the upright is about the same as standard type assemblies, but its tubular design is said to be stronger. Torsional rigidity is increased 80% and mast deflection reduced 50%. This design allows a 15% increase in hoist speed. Unit provides lift heights of up to 12 ft. on maker's gasoline-powered units, or on those operating on LP gas or diesel.

Load-raising speed is 58 ft. per min. with a corresponding increase in lowering speed. Slight horizontal carriage flotation permits truck to angle back out of tight positions after load depositing.

A piston-type cylinder with self-adjusting packing gland minimizes oil leakage and is protected from dirt and mechanical damage. All standard hydraulic attachments can be mounted on the attachment carriage. Non-hydraulic attachments are also available.—*Hyster Co., 2902 N. E. Clackamas St., Portland 8, Ore.*

Circle 119C on Reader Service Card

Falk ALL-STEEL Shaft Mounted Drives

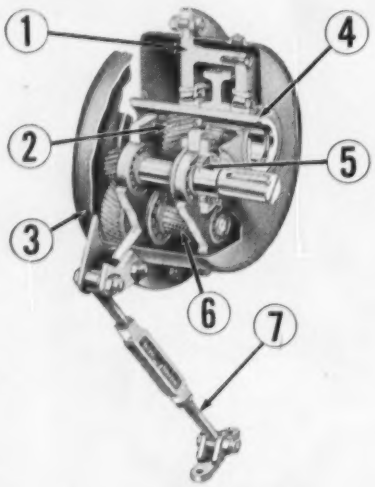


APPLICATIONS UNLIMITED

The range of applications to which the all-steel Falk Shaft Mounted Drive is ideally suited is so wide that complete listing is impracticable. The sketches above are included only to indicate a few typical installations where considerable speed reduction in limited space is an important advantage.

SIX SIZES

- 1/2 to 30 hp
- Single or double reduction
- Wide output speed range—420 to 10 rpm



These versatile, NEW speed-reducing units

save space, power, material and time

Here is the economical solution to the countless application problems requiring efficient speed reduction in limited space! The new Falk all-steel Shaft Mounted Drive—a modification of the universally-accepted Falk Motoreducer design—embodies many exclusive structural and functional features which add up to better service, longer life and substantial savings.

This rugged, compact drive mounts directly on the driven shaft—a distinct saving in floor space. Its precision Falk helical gearing gives highest mechanical efficiency, with a resultant power saving. No adjustable motor bases or slide rails are required. Installation is simple and rapid—output speeds can be quickly changed; thus time is saved...Write to Department 247 for engineering bulletin, including selection and dimension details.

FALK "In-Built" Factors... that give maximum efficiency, convenience and dependability

1 **All-steel Frame,** with more than double the rigidity of iron, supports all rotating elements.

2 **Precision Helical Gears,** designed and machined by Falk, rated to AGMA standards.

3 **Pressed Steel Housings,** whose sole function is to keep oil in, dirt out; easily removed for gear inspection without dismounting unit.

4 **Through Hollow Shaft** with counter bore provides for easiest installation or removal from driven machine shaft extensions.

5 **Backstop** can be furnished with the unit or added later for positive prevention of reverse rotation.

6 **Positive Lubrication,** continuous direct dip of revolving elements at all speeds.

7 **Tie Rod** and turnbuckle serve as anchor and facilitate V-belt or chain adjustment.

THE FALK CORPORATION, Milwaukee 8, Wisconsin

MANUFACTURERS OF

- Motoreducers
- Speed Reducers
- Flexible Couplings
- Shaft Mounted Drives
- High Speed Drives
- Special Gear Drives
- Single Helical Gears
- Herringbone Gears
- Marine Drives
- Steel Castings
- Weldments
- Contract Machining

FALK

...a good name in industry

For more information, use coupon on last page.

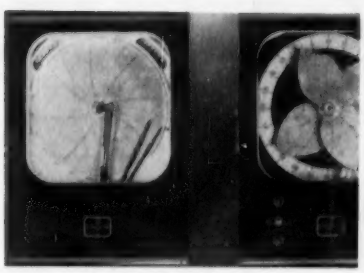
Synthetic Bottle Coating Serves Dual Function

As an outer coating for glass containers, an emulsifiable polyethylene (A-C) reportedly provides resistance to scratches that reduce strength and mar appearance. Furthermore, as an interior film, it promotes slip for foods (such as catsup) without impairing transparency.

This low-molecular-weight polymer is termed easily applied from a water system. Thus, it can be sprayed on the inside or outside of irregularly shaped bottles. A stable, clear emulsion is obtained even with formulations up to 40% solids.

Treatment is said also to cut production loss. And with reuseable containers, economy is seen through increased trippage.—*Semat-Solvay Petrochemical Div., Allied Chemical & Dye Corp., 40 Rector St., New York City 6.*

Circle 121A on Reader Service Card



Eight Operations Timed By Cycle Controller

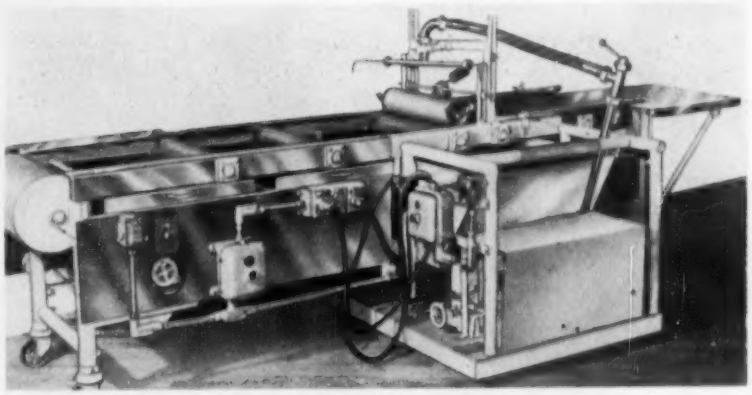
Combined in a compact two-case unit is a dual-pen, two-cam time-program instrument with cycle controller for timing up to eight operations.

Applications include: Automatic opening and closing of valves, switches, and dampers; starting and stopping of motors, pumps and blowers; and process control.

Cases can be mounted side by side or one above the other. Unit controls two variables such as temperature, humidity, pressure, or vacuum through any program by means of individually cut aluminum cams. These lock in any time relationship on a single hub, and cams can be changed as a unit in seconds.

Instruments are available in on-off or proportional electrical control, or pneumatic control in proportional, reset, or derivative modes.—*The Bristol Co., Waterbury 20, Conn.*

Circle 121B on Reader Service Card



Efficient Machine Ices Variety of Baked Goods

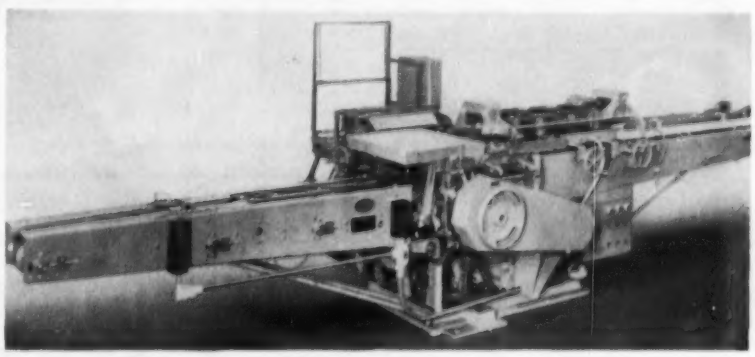
For simple, economical operation and maintenance, this multi-purpose icing machine combines a pump-operated icing tank with a wire conveyor in a single unit.

Called Frost-O-Fast, it may be used for all types of free-flowing icings on cup cakes and loaf, square and round cakes, as well as striping icing on sweet goods and Danish pastry. Moreover, a mechanical attachment enables icing on and off baking pans to impart a hand-iced appearance.

In addition, machine pours icing over items such as donuts, cup cakes, angel-food cakes, and petit fours. When a bottom plate is inserted into the conveyor, it also enrobes cakes. And a blower can be mounted over the conveyor to blow off excess icing. An important economy feature is continuous recirculation. Excess icing drops through wire conveyor (to which little adheres) into icing hopper where it is then recirculated. Unit has an open-hopper icing tank which slides out easily from below to allow refilling in operation, and cleaning.

Capacity of stainless steel tank is about 120 qt. and is heated by a 3,000w. immersion unit. Sanitary machine is available in several lengths with two or more tank pump units.—*Basic Food Sales Corp., Bancker St., Englewood, N. J.*

Circle 121C on Reader Service Card



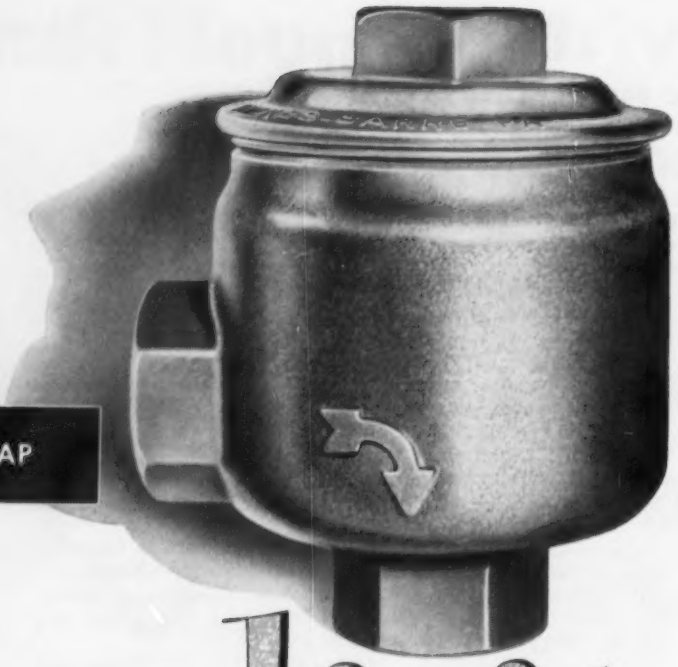
Frozen Foods Efficiently Wrapped at High Speed

Wrapping speeds of up to 160 rectangular cartons a minute, and accurate registration of printed wraps are reported for this machine, which uses any packaging material designed for frozen foods.

Overhead transport chain assembly, which carries packages through fold-line of machine, is counterbalanced so that it raises easily. This exposes the top package level for inspection. Operator can set by eye, as well as by feel, tucker assembly, folding boxes, heater unit, and belt discharge.

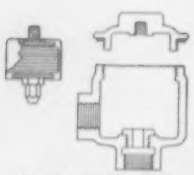
Automatic carton feeder and machine proper are one integral unit. Packages travel in a straight horizontal path without use of elevators or plungers. And an automatic package "feeler" in the conveyor stops feeding of paper when no package is fed.

Unit has electric-eye registration for printed material in roll form. A new method of feeding wrapping material



STEAM TRAP

Simplicity



Simple, positive action. Has only three parts —thermostatic bellows, body, cap. Won't leak!

Nicholson simplicity. Pays off big in food processing—in peak performance, easy maintenance. Simple in design, simple in operation, Nicholson Industrial Traps prove the most effective method for discharging condensate and air from steam lines.

- **Fast, intermittent valve action.**
- **Tight, positive shut-off.**
- **No dribbling. No waste of steam.**
- **Low operating cost. Low maintenance.**

Before you specify, check Nicholson. Write for *Catalog 953*.

NICHOLSON

W. H. NICHOLSON and Company

TRAPS • VALVES • FLOATS • METAL PARTITIONS

14 OREGON STREET, WILKES-BARRE, PA. • SALES AND ENGINEERING OFFICES IN 58 PRINCIPAL CITIES

into machine prevents slippage to assure accuracy even at top speed. And hand controls allow final positioning of printing on package while machine is running.—*Package Machinery Co., Springfield, Mass.*

Circle 121D on Reader Service Card

Wide Temperature Range For New Pipe Insulation

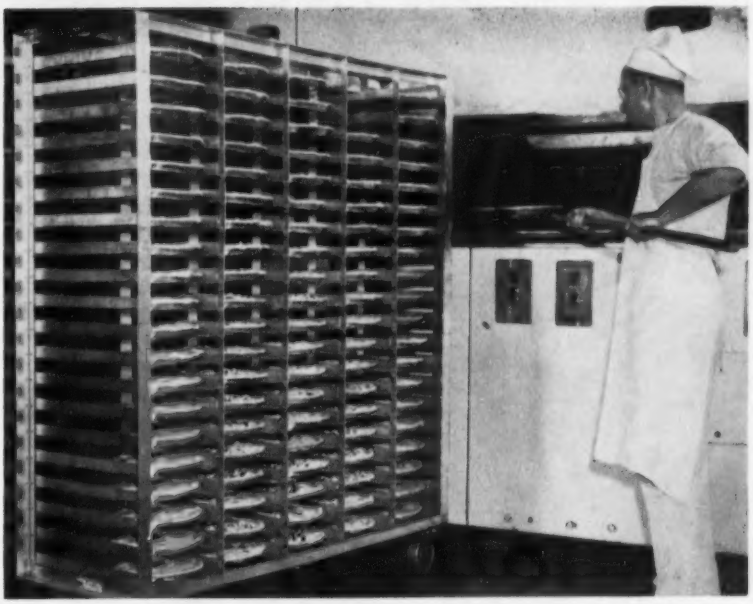
Efficient insulation and condensation protection for lines operating at low or alternating temperatures is reported with use of this product. Furthermore it does not rot, corrode, absorb odor, or sustain insect, vermin, or mold growth.

Known as Fiberblass White Dual Temperature, it can be used at temperatures from —120 to 250 F. A factory-applied vapor barrier prevents condensation and provides an attractive surface. Insulation is made of fibrous glass bonded with a thermosetting binder. Jacket is a 5-ply laminate having an inner asphalted kraft paper and an outer bleached kraft paper enclosing a .001-in. thickness of aluminum foil.

Material fits all standard pipe to 33 in. and copper tubing to 6 in. For pipe sizes including 12-in dia., insulation is furnished in hemi-cylinders with vapor barrier attached. For larger pipes, it is supplied in three segments to 28 in. and in seven segments to 33 in. Jacket is applied separately. All sections and segments are 3-ft. long.

Insulation, fastened in place with metal bands, is available in nominal thicknesses of 1, 1½, 2 and 2½ in. All conform to simplified dimensional standards or "nesting" sizes, permitting multiple-layer build-up.—*Owens-Corning Fiberglas Corp., Toledo 1.*

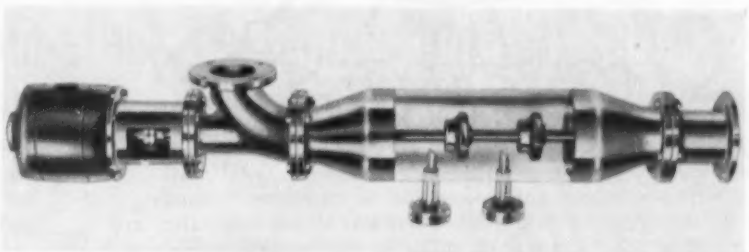
Circle 123A on Reader Service Card



Magnesium Pusharounds Ease Bakery Operation

This rack is made of lightweight magnesium for quick and easy transportation. Furthermore, the time-saving unit may easily be kept sanitary with alkali and detergent cleaners. Unit holds 200 pies for unloading into conveyor-type oven.—*Brooks & Perkins Inc., 1950 W. Fort St., Detroit 16.*

Circle 123B on Reader Service Card



Novel Pipeline Blender Eliminates Mix Tank

This dispersing unit is designed to instantly and uniformly blend liquids, gases, or slurries as they enter a pipeline carrying base fluid. Additive control over a wide range is offered.

Called Homomix, it is designed for continuous or intermittent operation in sizes ranging from 1 to 10,000 gpm. Mixer has one or more stages and forms part of the influent piping. Each stage consists of a diffusing impeller driven by a continuous shaft that is direct-connected to the motor. Impeller rotates in a blending chamber and discharges directly across the flow-through stream.

Mixing can be seen through a plastic port which may readily be opened for access to the rotating element. Unit can be installed in any position in the line, and may also be adapted as a low-lift, high-capacity pump.—*American Well Works, Aurora, Ill.*

Circle 123C on Reader Service Card

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FOR BAKED PRODUCTS AND FOR PREPARED MIXES

It is common knowledge that when "carry-through antioxidants" are used to stabilize shortenings, they are also selected for their ability to protect *baked products* against the development of rancidity. Sustane Six, containing only carry-through antioxidants as a synergistic mixture of BHA and BHT, offers maximum protection to baked goods.

Prepared mixes also need a stable carry-through antioxidant. While it is true that an antioxidant used in stabilizing a mix is not subjected to baking temperatures, to be most effective it must retain its full potency *after* the shortening is mixed with the product ingredients. A shortening stabilized with Sustane Six retains its *full* stability in a prepared mix.

For further details about Sustane Six write to:

PRODUCTS DEPARTMENT
UNIVERSAL OIL PRODUCTS COMPANY
30 ALGONQUIN ROAD, DES PLAINES, ILL., U. S. A.

Equipment & Supplies

Quality Control Simplified With Sugar Colorimeter

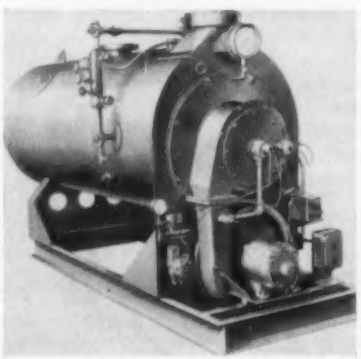
Of interest to sugar users is a photoelectric colorimeter designed to speed and simplify white-sugar color control.

Small, compact unit takes measurements at 420, 560, and 720 mμ. Thus, either the single-reading method at 560 mμ. or the double-reading method at 420 and 720 mμ. may be used for color-index checks.

Optical system includes a prefocused tungsten lamp, three interference-type filters with narrow band widths of 8-19 mμ., and a blue-and red-sensitive photo tube. Cylindrical sample cells, 10 cm. in dia., hold about 90 ml. of sample.

Operation is termed simple.—*Beckman Instruments, Inc., Fullerton, Calif.*

Circle 124A on Reader Service Card



Adjustable Boiler Converts From Hot Water to Steam

For plants using both steam and hot water, this 60-hp. combination boiler reportedly increases operational efficiency and cuts capital investment.

Basically a hot-water generator (Cyclotherm), it is quickly converted to

Want to get un-stuck on production difficulties?

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INDUSTRIAL PRODUCTS

COATINGS OF

"Teflon"* • Silicone rubber • Neoprene
Buna N • GR-S • Natural rubber

ON THESE FABRICS

Nylon • "Dacron"† • Glass
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Also sheet stocks without fabric inserts and cements

**Du Pont's trademark for its tetrafluoroethylene resin.*
†Du Pont's trademark for its polyester fiber.
‡Du Pont's trademark for its acrylic fiber.

DU PONT
REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

There are times when a product should *lose* its grip—improved "release," they call it. Take the case of electric irons used to heat-seal plastic films. Technicians of the Du Pont Fabrics Division suggested a *coated fabric* that proved ideal for covering the heating elements. It had the necessary heat resistance plus excellent "release"—no sticking whatsoever.

If you need a special gasket, seal, diaphragm or protective cloth material in your design—why not try a Du Pont coated fabric or sheet stock? You can obtain the exact combination of properties you need with the proper fabric and coating. Heat resistance with good "release," abrasion resistance with superior flexibility, oil resistance with high strength—these and many more combinations are possible.

We'll be glad to discuss possible application of coated fabrics in your design or on your equipment. Just clip and mail coupon for further information.

E. I. du Pont de Nemours & Co. (Inc.)
Fabrics Division, F-57, Fairfield, Conn.

I am interested in Fairprene Industrial Products.

( ) Have a representative call. ( ) Send further information.

Name_____ Title_____

Firm_____

Address_____

City_____ State_____

For more information, use coupon on last page.

Purity and Flavor of LeRoy's "Long Treat" Ice Cream Sandwiches

Safeguarded by TYGON TUBING

When LeRoy Foods, Inc., Brooklyn, N. Y., developed their patented process for making ice cream sandwiches, quality-conscious management faced a problem of major importance. LeRoy's process is based on the transmission of semi-solid ice cream directly from a continuous freezer to stainless steel filler nozzles which in turn fill pre-assembled boxed sandwiches.

Conventional tubings for transmission of the ice cream proved completely unsuitable. At the suggestion of one of the public health authorities, Tygon flexible plastic Tubing was tried. It worked perfectly.

Tygon answered LeRoy's needs on every count: it was completely non-toxic and non-contaminating, free from any tendency to impart taste or odor to ice cream; Tygon was glass clear, gave visible evidence of cleanliness; Tygon could be easily disassembled, easily and safely cleaned; and Tygon was flexible—gave operators complete freedom of action.

This exclusive process of LeRoy Foods, Inc., enables three operators to turn out 400 dozen "Long Treat" Ice Cream Sandwiches per hour.

If you process liquid or semi-solid foods there is a place in your operations where you can use Tygon Tubing to advantage. Bulletin T-77 free on request, tells the complete story. Write for it today.

90-D

U. S. STONEWARE • Akron 9, Ohio

PLASTICS & SYNTHETICS DIVISION

steam operation by a few simple adjustments. Both phases are automatic and fuel may be light oil, gas, or a combination of them. Unit delivers hot water with a 100-deg. F. rise, at 2,480 gal per hr., and raises steam with pressures of 15 to 200 psi. at 2,070 lb. per hr.

Changeover from hot water to steam takes 5 to 10 min. Operator shuts off main hot water inlet and outlet, drops water level, and switches control panel from "aquastat" to "pressuretrol." Boiler has dual control equipment as well as dual steam and hot-water take-offs.—*Cyclotherm Div., U. S. Radiator Corp., Oswego 1, N. Y.*

Circle 124B on Reader Service Card

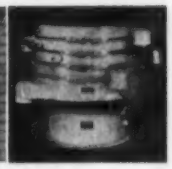
Efficient Ice-Making Units Offer Marked Economy

Speed, economy, and compactness are advantages reported for a new line of portable ice makers that produce small, irregularly shaped pieces at rates of ½ to 30 tons per 24 hr. Applications include icing of poultry, bottled milk, seafoods, and fresh produce. Shown above is the 6-8 ton model.

Known as Shell-Ice Maker, units consist of a series of 4-in. stainless tubes suspended vertically, and cooled with direct-expansion ammonia or Freon. Depending on refrigerant temperature, they produce a ton of ice daily for each 9 to 12 ft. of tube length.

In operation, clean water flowing

SCREENING NEWS



Shrimp Canner Recovers By-Product Halts Stream Pollution with SWECO

Screening problem: Recovery of high-protein cannery waste by the Robinson Canning Company, Westwego, Louisiana, for by-product resale to fertilizer mixers. Specifications: 800 GPM water carrying waste solids from shrimp canning operations. Previously unable to screen material due to blinding or clogging of screens!

SWECO solution: one 48-inch SWECO Gyratory Screen Separator with 20-mesh stainless steel cloth handles 800 GPM throughput without blinding. The SWECO installation shown below provides maximum throughput, minimum imparted vibration and minimum operating space. Results: (1) recovery of profitable by-product, (2) elimination of stream pollution, (3) Company highly satisfied with SWECO performance.

44% of the Largest U.S. Firms Use SWECO Separators

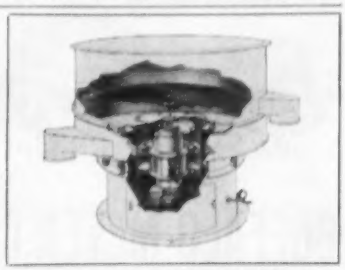
According to a recent customer survey, 55% of the nation's largest manufacturers use the products and/or engineering services of Southwestern Engineering Company. 44% are satisfied customers and users of SWECO Gyratory Screen Separators.

SCREENED WASTE SOLIDS are fed from screen spout to a conveyor belt. Material is dried, ground and sold to fertilizer mixers.

REAR VIEW shows two over-size discharge spouts below the screen which handle 800 GPM of cleaned waste water for discharge into a nearby canal.

Brewing Industry Uses SWECO in New Separation Process

New uses for SWECOs show a sharp up-trend in the Brewing Industry. In addition to the usual screening of dry cereals, wet hulls and cereal mashes, sal debris from wheat starch, etc., SWECOs are being used with marked success in the more efficient separation of wort and trub. The new method cuts down on trub "return" as the wort is decanted, and recovers an extra two barrels of wort per brew, from the remaining slurry.



SWECO "3-D" SCREENING ACTION tumbles material in three directions at once... increases efficiency as much as 10 to 1.

SWECO

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SWECO PRODUCTS

Screen Separators
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Custom fabrication of special vessels for the process industries

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☐ Have a SWECO Screening Engineer call us.

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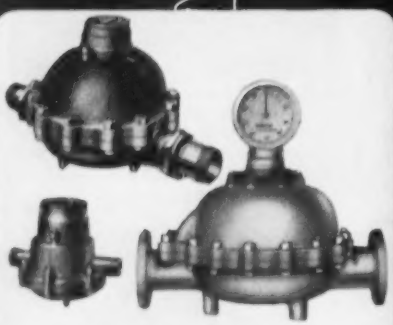
"I suggest NIAGARA METERS
Their wide range will give us
ACCURATE MEASUREMENT
of all liquids we use!"



The excellent accuracy of NIAGARA METERS minimizes waste and losses in the measurement of chemicals, solvents, oils, hot water, cold water, syrups and other liquids. Nearly all volumes and types are handled, from 1/30 to 1000 gallons per minute. Special electric contact meters for automatic batch metering. Stainless steel meters for corrosive liquids.

Be sure you know all the advantages of NIAGARA METERS.

Send in the Data Request blank below — today.

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BUFFALO, N.Y.

Gentlemen:
Please send me complete information on the use of economical NIAGARA METERS, based on the data below:

Liquid _____ Pressure _____ p.s.i.
Temp. _____ °F.
Flow rate _____ g.p.m.
Maximum batch _____ gals.
Name _____ Title _____
Company _____
Address _____

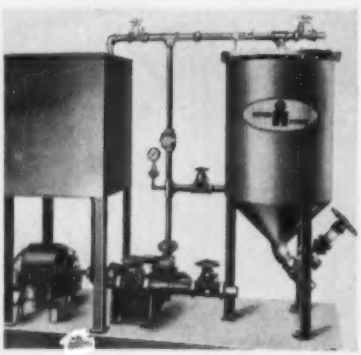
Equipment & Supplies

down the outside of the tubes provides sufficient agitation to make clear ice, which freezes to a thickness of ⅛ to ½ in. Then, water and coolant are automatically cut off. Warm ammonia or Freon enters the tubes by a special arrangement that first thaws tube bottoms. Ice is harvested in seconds as it slides down the tubes and passes over a breaker.

Action is so fast that ice ¼-in. thick is said to be frozen and collected in about 10 min. Product includes no scrapings or snow, and has no sharp edges. Weighing about 34 lb. per cu. ft., pieces are small enough to pack closely around foods.

Units are available in 12 sizes. The 20-ton machine is 8½ ft. long, 5½ ft. wide, and 18⅛ ft. high.—*Frick Co., Waynesboro, Pa.*

Circle 127A on Reader Service Card



Stainless Pressure Filter Has Self-Cleaning Unit

To cut labor and maintenance costs, this portable, closed-type filter employs a self-cleaning backwash device and a stainless, wire-wound cylinder that supports the filter medium.

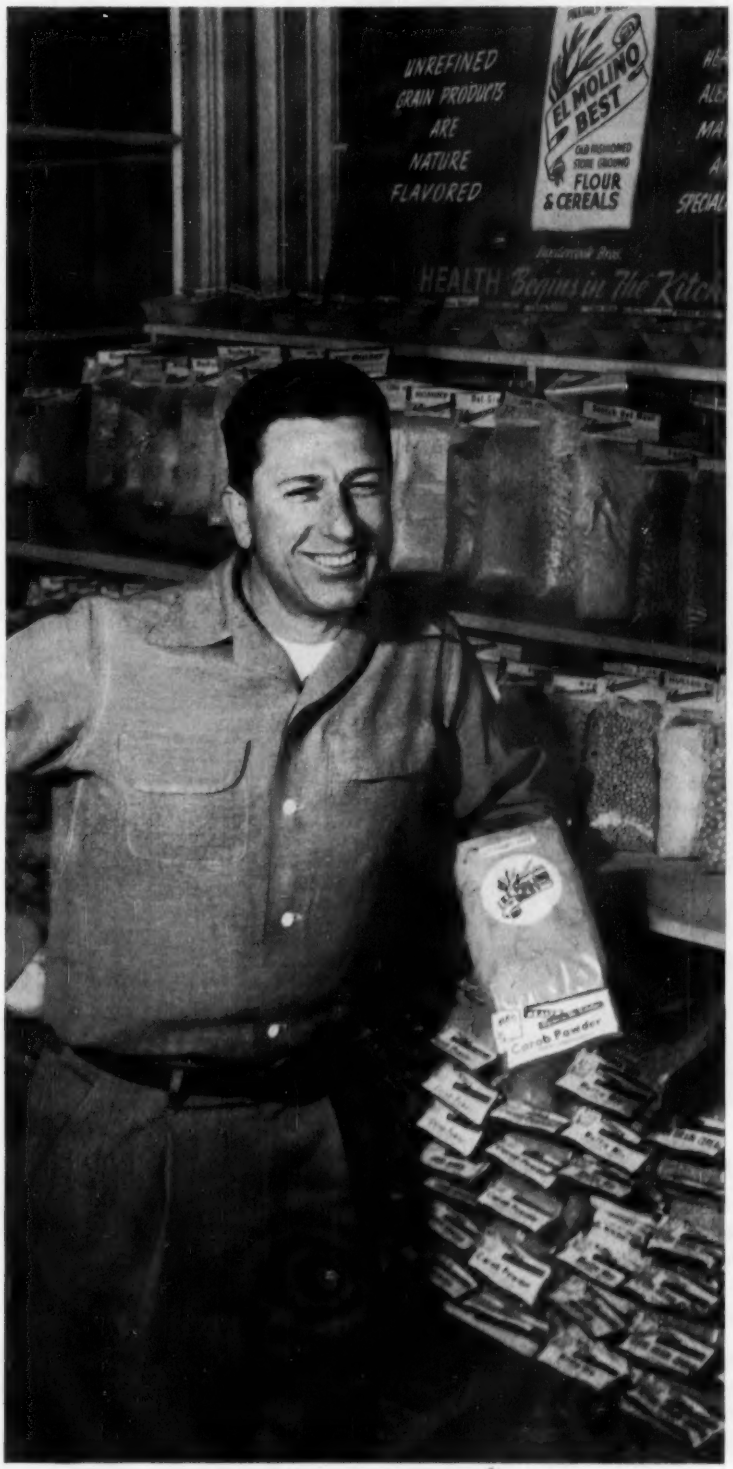
By eliminating need for bags, sheets, or pads, unit (Hygrade) is said to speed processing of a wide variety of liquids down to ⅒ micron, while its stainless cylinder construction prevents corrosion. Simple backwash device is activated by turning two valves.

Filtration media include: Porous stone tubes and carbon, stainless wire mesh, diatomaceous earth, and macerated wood and paper pulp. Furthermore, removal of color, taste, and odor may be accomplished by using activated carbon.

Complete unit consists of a precoat tank, splash-proof motor, pump, filter pressure chamber, suction and discharge valves, and a pressure gage. —*U. S. Hoffman Machinery Corp., 105 Fourth Ave., New York City 3.*

Circle 128A on Reader Service Card

DEFINITELY it pays to package in film made of BAKELITE Polyethylene



Packaging by **Howard Plastics,** Council Bluffs, Iowa

"problems were completely eliminated"

That's the overall picture of the job that packaging in film made of BAKELITE Brand Polyethylene does for El Molino Mills, Alhambra, Calif. The Vandercook brothers, owners and partners, divide their success story into two parts – *results,* and *reasons.*

The RESULTS:

- "Our sales have increased 10 times since we made the change to polyethylene.
- "Sales of muffin mix increased 300% the first year.
- "There have been savings right down the line . . . to us, to the retailer and consumer. While costs to consumers are steadily rising in nearly all items on the market today, our products are selling for less – all because of polyethylene bags."

The REASONS:

- "Polyethylene bags will stand up under the roughest treatment.
- "Our products are highly perishable. Today, in easily sealed polyethylene bags, oxidation and rancidity don't take place . . . and they ship for any distance without infestation.
- "Not only does polyethylene increase the shelf life of our product, but it makes it look so much better. Retail outlets are exceedingly happy."

There are many sound reasons why packaging in film made of BAKELITE Polyethylene can bring the same, and even more advantages to the food products you market. Call your packaging supplier.

SPECIFY FILM MADE OF

BAKELITE
BRAND
Polyethylene Plastic

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The term BAKELITE and the Trefoil Symbol are registered trade-marks of UCC

Processing...ON THE "BEAM"

THE "WALKING BEAM" OF THE *B-W VORTEX*

Protects Your Processing Reputation

This unique B-W conveyor is simply a series of stainless steel strips, mounted on two grates, and running lengthwise through the machine. By alternately raising each grate and moving forward, lowering and returning to their original position, they carry containers.

As it moves containers through the Vortex, the "walking beam" does not itself change temperature. There is no chain to require reheating or recooling in traveling through processing zones. Since the conveyor is in a sense, stationary, there are no moving parts to maintain or lubricate.

Operation is entirely automatic and continuous. Infinite speed and temperature adjustments are provided to meet varying process requirements . . . assure perfect control of your product's quality.

The "walking beam" conveyor, trouble-free hydraulic drive and the atomized spray system combine to produce the finest results at a minimum of operating and maintenance expense . . . whether used to heat, cool, freeze, pasteurize or exhaust.

For full information and technical bulletins, write:

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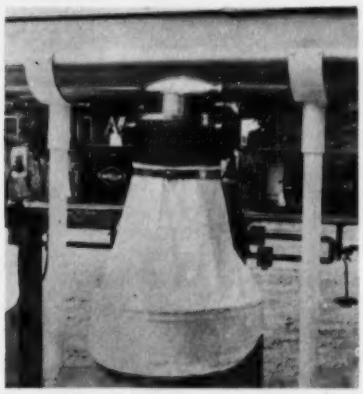
4660 West Florissant Avenue • Saint Louis 15, Missouri



Bulk Packaging Eased By Automatic Sacker

Constant supervision of weighing and packaging reportedly is eliminated with this automatic sacker.

Equipment is available in units of two sackers or more. In tests, a 5-position unit delivered 1,000 lb. per hr. of skim milk solids to each barrel which was accurately weighed to within ¼ lb.

Unit consists of a stainless conveyor trough, cadmium-plated screw, and scale beams adjustable for tare and net weight. Discharge ports are manually opened as container is set in place. When exact amount is discharged, a magnetic mercury switch trips a relay to activate a solenoid. This automatically closes the port with a spring-loaded gate.

Conveyor screw is powered by a ½-hp. gear-head motor.—*Blaw-Knox Co., Farmers Bank Bldg., Pittsburgh, Pa.*

Circle 131A on Reader Service Card

Adjustable Drive Offers Precise Speed Control

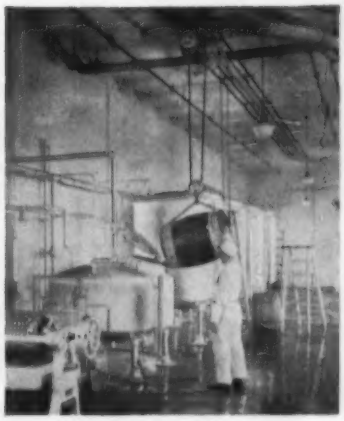
Operating from a.c. circuits is a packaged, all-electric adjustable drive designed for superior speed regulation even at low speeds.

Called Select-A-Spede, its components include a self-ventilated cabinet-type power unit, operator's control station, and d.c. driving motor. Power unit consists of a motor-generator set for converting a.c. to d.c., a control panel, and dry-type selenium rectifiers for supplying d.c. excitation to generator and driving motor fields.

Unit provides an infinite number of speeds over a wide operating range. An open drip-proof drive motor may be run at any speed from ½ to full base speed. (Latter is speed of motor when rated armature and field volt-

SHEPARD NILES Floor-Operated Hoist

Operator mainly occupied with other duties. Hoist used for fast, efficient handling of relatively short hauls.



WHICH HOIST is RIGHT FOR YOUR JOB?

SHEPARD NILES Cab-Operated Hoist

Operator in cab moves loads along at high speeds . . . occupies best vantage point for spotting or stacking materials.

Let the Shepard Niles representative in your area guide you in your choice. He specializes in through-the-air handling . . . can help you select the hoist that best fits your job. Write Shepard Niles today for latest bulletins describing both types of hoists . . . and ask to have a representative stop by your office.

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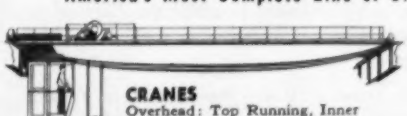
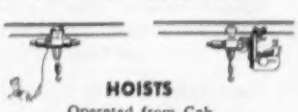


CRANES
Overhead: Top Running, Inner Running, Under Running, Floor or Cab Operated.



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Operated from Cab, Floor or Pulpit.

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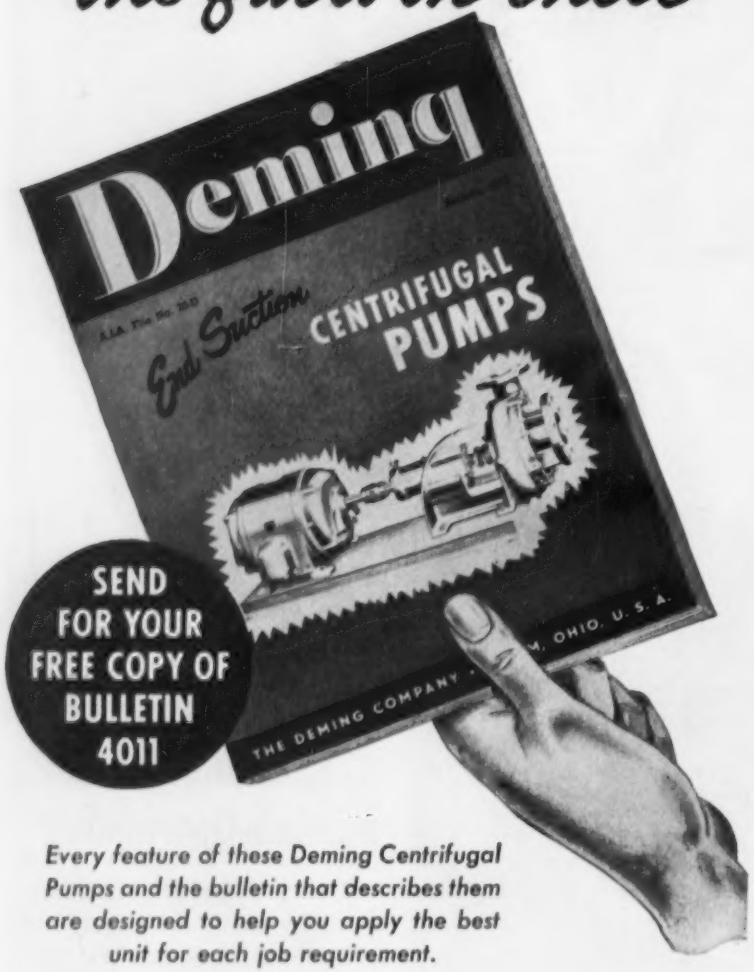
Make Sure You Have the facts on these



SEND FOR YOUR FREE COPY OF BULLETIN 4011

Every feature of these Deming Centrifugal Pumps and the bulletin that describes them are designed to help you apply the best unit for each job requirement.

A system of unit numbers is employed in Bulletin No. 4011. Performance tables and curves for Belt driven and Motor driven units give full information and can be cross checked. Selection of the unit number from a curve guarantees non-overloading of the motor or other source of power.

The Deming Fig. 4011 Series of End Suction Centrifugal Pumps are designed to handle a wide variety of liquids. The separate liquid end construction can be furnished in special alloys for handling corrosive liquids, when specified. The support head can remain standard cast iron construction at an appreciable saving to the customer compared with an all-special alloy construction. Various optional features make it possible and economical to adapt these pumps to many applications. Sizes range from 1 to 5-inch discharge; capacities up to 1,000 g.p.m. and heads to 250 feet.

These versatile Deming Centrifugal Pumps offer you the solutions to a wide variety of liquid materials handling problems.

Send for your free copy of Bulletin 4011 NOW!

75th ANNIVERSARY DEMING PUMPS 1880 · 1955

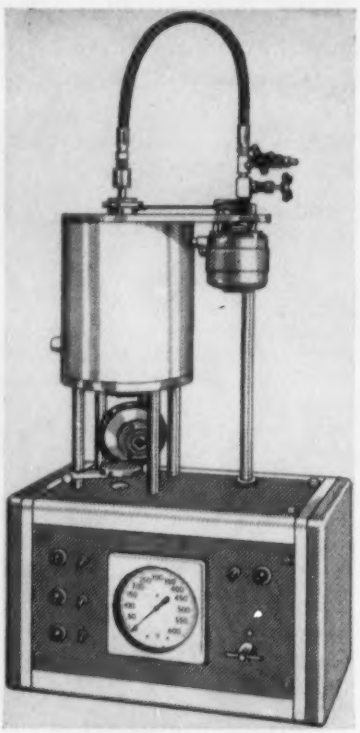
THE DEMING COMPANY
566 BROADWAY • SALEM, OHIO

Equipment & Supplies

ages are applied.) For other applications, a special control circuit and motor design permit speeds from below ½ base to as high as five times base speed.

When operating below base speed, this unit is essentially a constant-torque device. However, when used in conjunction with a motor capable of speed adjustment by field weakening constant horsepower characteristics are obtained in the above-base speed range.—*Louis Allis Co., Milwaukee 7.*

Circle 1318 on Reader Service Card



Quickly Gages Viscosity At High Flow Rates

In production control or for research, this new line of rheometers is designed for quick and accurate viscosity measurement at high rates of flow.

Operation is simple. Air pressure applied to a material chamber extrudes the sample through a calibrated orifice. Elapsed time is a measure of viscosity. Seven models cover the range from room temperature to 572 F., and pressures from atmospheric to 3,000 psi. Special attachments extend this range to −40 F., and 5,000 psi. And reproducible accuracy is reported from 1 cps. to over 5 billion cps.

Rheometers are complete unit-

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McAleenan's key personnel have the necessary technical and field experience in design, fabrication and installation to accomplish your most demanding fabrications with precision and speed. Of particular pride are our welding specialists who are responsible for the exacting job of final assembly. These men have mastered the highly skilled art of welding and interwelding carbon and alloy steels to a degree that assures the maximum mechanical strength plus corrosion resistance across the zone of the weld. Remember, the more intricate the job, the more selective should be your choice of fabricators. So—turn to McAleenan for faster, more experienced fabricating service! We fabricate to your specifications or, if preferred, our engineering staff will design equipment to your requirements. Mail us your blueprints today, for quotation.

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Division of Overly Manufacturing Company

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SODIUM BENZOATE REPORT:

Spoiled margarine loses customers, costs you money...insurance is cheap

Make *sure* your products won't spoil by using safe Sodium Benzoate—the only *completely* dependable insurance you can buy. Sodium Benzoate keeps products fresh by controlling the growth of yeast, mold and bacteria that cause spoilage. It's low-cost insurance, too! Only a fraction of one per cent in margarine gives your product *months* of freshness.

Refrigeration and quick delivery of perishables are important, too. But insist on Sodium Benzoate, then you're *really* sure!

Organic Chemicals Division
MONSANTO CHEMICAL COMPANY
Box 478-E-5, St. Louis 1, Missouri

MONSANTO

SERVING INDUSTRY . . . WHICH SERVES MANKIND

46¢ PROTECTS 1000 LBS. One pound of Sodium Benzoate costs only 46¢* yet it's enough to protect 1000 lbs. of margarine! Because most food products require only 0.1% sodium benzoate to insure freshness, this effective preservative is the cheapest insurance on the market!
*Subject to change without notice.

package instruments delivered ready for use. Units are termed easy to set up and can be quickly dismantled for cleaning.—*Burrell Corp., 2223 Fifth Ave., Pittsburgh 19.*

Circle 132A on Reader Service Card

Filtration Factors Studied With Pilot Pressure Unit

Offered for gaging characteristics such as flow rate, cake density, washing efficiency, and variation of flow with pressure and throughput, is a fully enclosed portable filter. In addition, precoat materials and filtration fabrics may be evaluated.

Known as Pronto-Junior, it uses Type 316 stainless for all liquid contact parts, and Teflon or neoprene gaskets. Unit is quickly disassembled by removing four nuts from the tie-rods. Maximum working pressure is 80 psi.

Either one, two, or three vertical leaves may be used. These are covered with 24x100 Dutch-weave metal cloth, and bound in U-shaped frames. Outlet nozzles are sealed by "O" rings that have tie-grooves for textile fabrics. Three leaves on 1¼-in. centers provide 1 sq. ft. of surface. To prevent cake erosion, feed-pipe ports face away from leaf surfaces.

Filter measures 6½ in. dia. x 16 in. tall, and can be set up in the laboratory or in the plant to check liquids as they are processed.—*American Plant Equipment Co., 701 Spring St., Elizabeth 4, N. J.*

Circle 135A on Reader Service Card

Want More Information?

It's free—and easy to get. Simply note here the items on which you want more details, then circle each key number (there's one given at the bottom of each item) on the handy Reader Service postcard—back of book. Then sign at the bottom and mail.

For your convenience, too, items in this department are listed and keyed in the Reader Service Section.

Saves time and money on coding, imprinting labels!

Even in small operations, the Tickometer has made substantial savings in the cost of coding and/or dating product labels. In large companies, batteries of Tickometers are tremendously effective in reducing costs.

The Tickometer codes, dates, or otherwise imprints labels and wrappers at speeds *up to 1000 pieces per minute* . . . can save losses on unused labels that have pre-printed identifications. This remarkable, electrically operated machine also *counts* as it imprints. Gives whole or partial counts. Handles most any kind of card or paper item. And it's so *accurate*, banks use it to count currency! Without question, here is your easiest and most economical way of dating and identifying your products.

Rented, as well as sold, the Tickometer is serviced by Pitney-Bowes from 259 places, coast-to-coast. Ask your nearest PB office for a demonstration, or send coupon for free illustrated booklet and folder of case studies.

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Made by the originators of the postage meter . . . offices in 94 cities in U.S. and Canada

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PRECISION HEAT CONTROL
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VACUUM STEAM TUBULAR HEAT EXCHANGERS

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SAY "SEE-AR-CO"

IT PREHEATS
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STEAM IS INJECTED UNDER VACUUM FOR EVEN, INSTANTANEOUS DISTRIBUTION
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CRCO's Vacuum Steam Heat Exchangers provide accurate, automatic heat control in processing chopped and crushed products, vegetable and fruit juices, nectars, semi-liquid products, syrup; in fact, almost any product that can be pumped. Available in various capacities.

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CHISHOLM-RYDER CO. INC.
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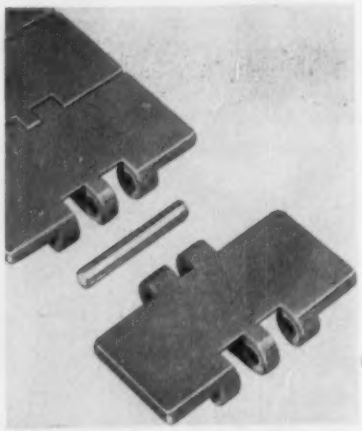


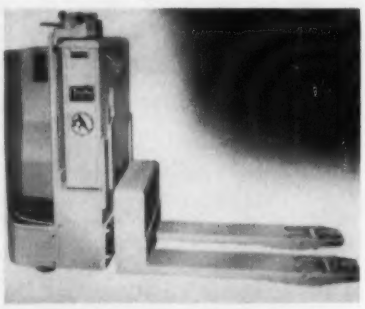
Nylon Conveyor Chain Offers Many Benefits

Lower operating and maintenance costs, smooth transfer, and ease of cleaning are advantages cited for a new nylon flat-top conveyor chain (N820 TableTop) requiring no lubrication. Flight width is 3¼ in.

Links of the two-piece design (similar to maker's carbon and stainless units) are molded of light-weight nylon. They are joined by stainless pins to form a smooth platform without gaps that trip containers. Hinged joints and platform overlap offer a continuous, level carrying surface.

A center guide bar controls the chain on the sprockets, which can be adapted to nylon operation by cutting a center groove.—*Chain Belt Co., Milwaukee 1.*

Circle 136A on Reader Service Card



Low-Lift Rider Truck Is Easily Controlled

Offered for quick and easy load transporting is a new line of low-lift rider trucks in capacities up to 4,000 lb.

Included are types for handling single-face or double-face pallets (photo), and those for skid platforms. With a top speed of 4½ mph.,

much more than a common carrier... JEFFREY HOLLOW-PIN chain

You are not just looking at the "hole in the doughnut." Functional use of Jeffrey Hollow Pin Chain has many applications. In the baking industry, for instance, this chain makes it easy to attach trays and other fixtures to be conveyed. Supporting rods are simply inserted in the pins. The chain runs on rollers; gives smooth operation and firm support.

Jeffrey offers a full line of Hollow Pin Chain in a variety of pitches to suit your particular spacing requirements. Pin and bushings are hardened and ground for smooth, tough wearing surfaces. Sidebars and rollers are heat-treated to specifications for your application.

To improve the quality and performance of your equipment, let Jeffrey engineers help you determine the right chain or other component parts.

Jeffrey Hollow Pin Chain takes trays of bread on a smoothly-timed trip through bakery oven.

JEFFREY Equipment for the Food Industry

Apron, Belt, Scraper and Spiral Conveyors • Batch Weighing and Proportioning Systems • Cane and Pulp Shredders • Garbage Grinders • Vibrating Feeders • Conveyors • WAYTROLS • Car Pullers • Power Scoops • Juice Strainers • Sugar Minglers • Power Transmission Machinery • Bucket Elevators • Chains and Sprockets • Coolers • Packers

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IF IT'S MINED, PROCESSED OR MOVED ...IT'S A JOB FOR JEFFREY!

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These Flo-Sweet services cut your sugar costs

"Talk about service—we even help you plan ahead!" exclaims your Flo-Sweet Engineer. "That's why, when you use Flo-Sweet, you get greater satisfaction at every step. From the time you first consider liquid sugar, during equipment layout and installation, up through carefully timed deliveries—the Flo-Sweet technical staff is at your service. Here are six important ways they can help you save."

FORMULA CONVERSION

Flo-Sweet specialists readily convert your present dry sugar formulas to liquid.

STORAGE

Flo-Sweet's huge storage facilities free you from carrying costly sugar inventories.

SUGAR SYSTEM LAYOUT

Flo-Sweet engineers' quarter century's experience with liquid sugar systems saves you time and expense.

DELIVERIES

Flo-Sweet has set the pace for the industry in prompt liquid sugar deliveries.

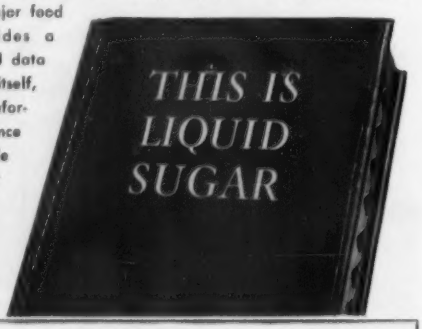
SPECIAL EQUIPMENT

Design and installation of special sugar handling and processing equipment are routine procedures for Flo-Sweet engineers.

RESEARCH

Flo-Sweet laboratory technicians have long experience in helping customers solve problems involving sugar.

"MUST" READING FOR EVERY SUGAR USER: This authoritative new manual contains over 200 pages of detailed information on the design, installation and operation of liquid sugar systems. It covers the use of liquid sugar in major food industries, provides a wealth of technical data on liquid sugar itself, and gives specific information on performance and costs. A valuable reference work for every food technologist's library. Price $5.00.



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FLO-SWEET
FIRST IN LIQUID SUGAR

SERVING INDUSTRIAL SUGAR USERS EXCLUSIVELY
FROM YONKERS—PITTSBURGH—TOLEDO—DETROIT

Equipment & Supplies

they are termed well suited for order selection.

Operator is fully protected by a solid, reinforced sheet-steel backrest, and has all controls for direction, traction speed, braking, and lift and lower in one finger-tip location. Units have three speeds forward, and reverse with dynamic braking.

Truck width at operator's end is 32 in. Pallet model is made in 6 lengths from 32 to 60 in., and in 3 widths from 25 to 30 in. Platform model is available in 7 lengths from 30 to 72 in., and in 2 widths—18 and 25 in. Lift on both types is 4 in.—*Lewis-Shepard Products, Watertown, Mass.*

Circle 136B on Reader Service Card

New Chemicals

Non-Caustic Detergent Is Fast Degreaser

This product is recommended to processors of fatty oils and meats for rapidly emulsifying all types of oil, thus leaving a chemically clean surface.

As a general-purpose detergent (Planisol), it may be used for jobs ranging from cleaning large vessels heavily encrusted with polymerized oil to sanitizing food-processing equipment. Material is said to have excellent bactericidal properties (phenol coefficient of 2.0), deodorizes as it cleans, and does not attack aluminum.

Cleanser is highly alkaline but contains no caustic soda or potash. Therefore, it can be safely and easily handled by plant personnel. Also, product is non-toxic and non-inflammable.—*Votator Div., Girdler Co., Louisville, Ky.*

Circle 139A on Reader Service Card

High-Gloss Lacquer Film Has Many Advantages

Superior protective and decorative coatings for paper, box board, and foil are reported with use of a new lacquer.

Called Half-Second Butyrate, material produces transparent films that do not discolor with age. Other advantages include high strength, gloss, flexibility, and abrasion resistance.

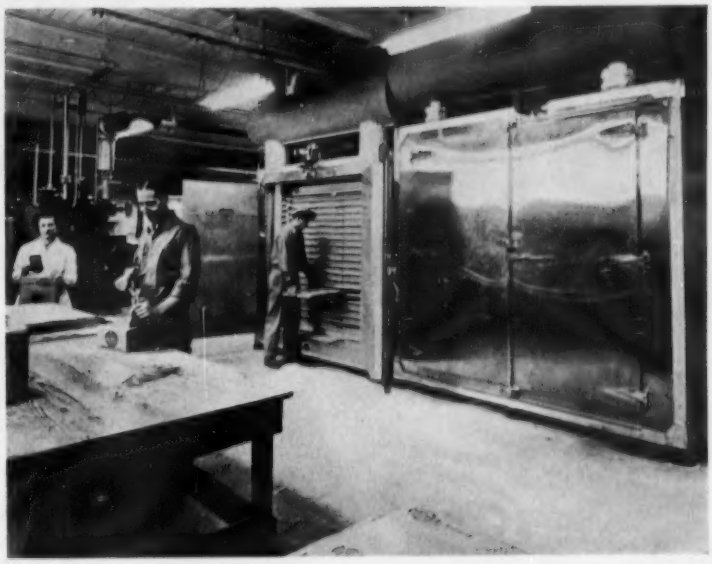
Films are naturally heat-sealable, while coatings may readily be applied with existing equipment, either as a solvent solution or hot melt. Coverage per gallon is termed high.—*Eastman Chemical Products, Inc., Kingsport, Tenn.*

Circle 139B on Reader Service Card

AMERIO

DOUBLE CONTACT Pressure Plate Freezers

(U.S. Pat. No. 2,608,069) (Canadian Patent No. 494,746)



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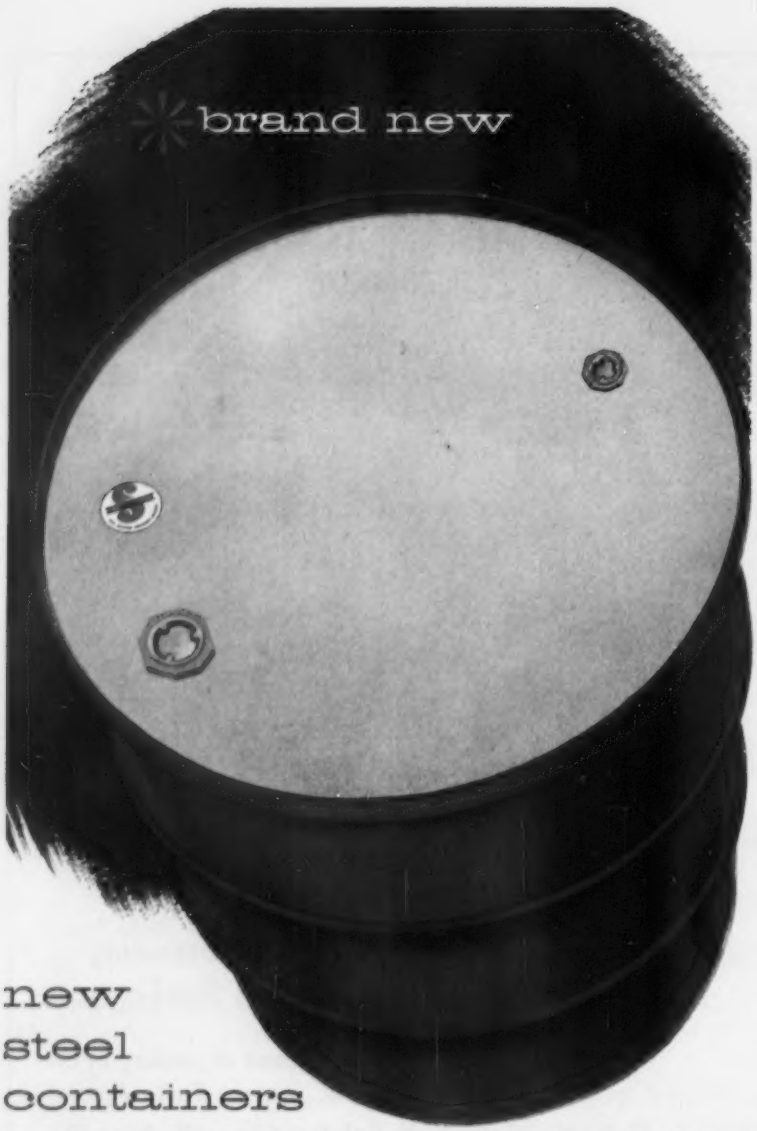

new steel containers promote brand name sales

Whether you're selling an established brand name or marketing a relatively new product, you can really get the jump on competition by shipping in new steel shipping containers. New steel containers decorated with your trade mark and bearing the "Red-S" label of the Steel Shipping Container Institute, will create brand preferences . . . build the kind of customer goodwill that brings in repeat orders. They not only add sales appeal to products but they afford maximum protection . . . guard against losses due to leakage and product contamination.

New steel containers are made to meet the Recommended Universal Specifications of leading consuming industries and to conform to Bureau of Explosives and Interstate Commerce Commission regulations.

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Equipment & Supplies

Plant Safety Increased By Floor Covering

Seen preventing accidents on slippery floors, stairs, ramps, and steel floor plates is a new semi-plastic coating called Non-Skid.

Formulated with chlorinated rubber for extra adhesion and flexibility, coating is applied with a trowel on wood, metal, or concrete. Material is termed resistant to acids, alkalies, grease, and scrubbing, and is available in four colors.—*The Garland Co., Cleveland 5.*

Circle 140A on Reader Service Card

Briefs . . .

Milk Carton Filler automatically handles 30 Canco or Sealking quart carton per minute. Unit incorporates magazine carton feed, precision filling mechanism, and automatic carton-opening, closing and sealing devices. —*Mojonnier Dawson Co., 9151 Fullerton Ave., Franklin Park, Ill.* (140B)

Infra-Red Unit that continuously analyzes gas or liquid streams and detects trace materials in ppm. range is offered by—*Perkin-Elmer Corp., Norwalk, Conn.* (140C)

High-Speed Scroll Shear is designed for blanking can ends, bottle caps, and jar tops. Unit has wider bed for handling wider sheets—up to 36 in. square—which allows more strips per sheet.—*E. W. Bliss Co., 50 Church St., New York 7,* (140D)

Portable Moisture Tester for granular materials gives instantaneous readings as low as 0% within close tolerance. Unit first places product under hydraulic compression for uniformity.—*Moisture Register Co., 1510 W. Chestnut St., Alhambra, Calif* (140E)

Pallet Loader served by short inclined conveyor, deposits packages in tiers according to predetermined pattern.—*Alvey Conveyor Mfg. Co., 9301 Olive St. Road, St. Louis 24.* (140F)

Two-Way Mobile Radio, operating in 25-50 megacycle band, transmits up to 110w. signal. Unit may be mounted under dashboard or in trunk.—*General Electric Co., Syracuse, N. Y.* (140G)

Dry Ice Crusher automatically reduces 50-lb., 10-in. cubes to variety of sizes at up to 12 tons per hr.—*Franklin P. Miller & Son, Inc., 36 Meadow St., E. Orange 17, N. J.* (140H)

STANODRIP *Oil whips lubrication problem at Wilson Milk Company*

MANAGEMENT OF THE Wilson Milk Company plant, Sheridan, Indiana, had a serious lubrication problem. STANODRIP Oil solved it.

In overhead bin loaders, hydraulic rams push powdered milk along conveyor chute to weighing machine. Leakage of lubricant from rams on the floor below caused a sanitary and safety problem. Packings were replaced every two months but leakage often recurred as early as two weeks after packing replacement.

Then Mr. Taylor Wiham, Assistant Superintendent, called in John Pirtle, Standard Oil Industrial lubrication specialist. Mr. Wiham asked about STANODRIP Oil and its possible use as a solution to this lubrication problem. Decision was made to convert to STANODRIP Oil No. 29. Old oil was removed, packings replaced and STANODRIP installed.

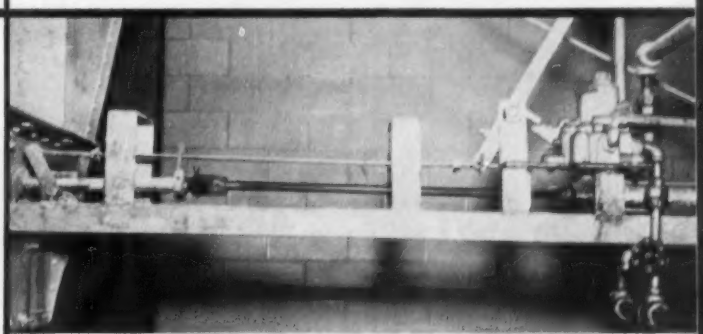
In more than 8 months since installation of STANODRIP Oil, there has been no leakage, no packing replacement. Hydraulic rams are lubricated without oil dripping or creeping.

Maybe STANODRIP Oil can serve you as it has Wilson Milk Company. Find out. In the Midwest, call your nearby Standard Oil lubrication specialist. Or contact Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

Taylor Wiham, Wilson Milk Company (right), and John Pirtle, Standard Oil lubrication specialist, inspect oil stain on otherwise spotless floor, the result of previous oil leakage from overhead hydraulic bin loader. Leakage has been eliminated through use of STANODRIP Oil No. 29. Helping customers with lubrication problems is something John Pirtle is well equipped for. John has an engineering degree from Rose Polytechnic Institute, has completed Standard Sales Engineering School and has a number of years of field technical service experience. Customers find this experience and training pay off *for them.*

STANDARD

STANDARD OIL COMPANY
(Indiana)



Three bin loaders like the one shown here dripped oil until converted to STANODRIP. No leaks have occurred in 8 months since. Previously, packings were replaced every two months. Even then leakage often recurred as early as two weeks after repacking.

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—Continued from page 58

dark coating held at 91 F. in the enrober, Mr. Newth found that the coating cooled to approximately 70 F. before entering the cooling tunnel. This indicates that all sensible heat, and part of the heat of crystallization, had been given off in this 22-ft. run. Remaining was little heat for the tunnel to take out in 80 ft.

Cooling both centers and coating to 65 F. would be ideal.

Centers (40-count finished goods) for this test were run at 74 F. and, when finished, cooled to 58 F. Tunnel temperatures ran from 65 to 52 F. on top of the belt and 40 F. below. Cooling of the bottoms is a major factor in cooling efficiency.

The packing room should be between 65 and 68 F., with an R.H. of 55% or lower. For ease of operation and efficiency, a minimum of 2½ ft. of packing table per girl should be provided. Boxed goods removed from the packing table should be left uncovered as long as possible to permit the coating to further cool and prevent heat from confining within the box to do damage.

Storage temperatures should run between 65 and 68 F., with an R.H. not over 55% to avoid sweating when goods go to higher temperature.

Mr. Newth then pointed out that the ideal way to cool chocolates is "from the center outward," rather than present practice of cooling from the outside and then slowly into the center.

PREPARING CENTERS

Centers for coating should not sweat and allow the coating to peel off—with mold forming between center and chocolate—in the opinion of Clifford Clay, Stephen F. Whitman & Son. They must not break down when coated with warm chocolate nor expand and split the coating.

They should not be so oily that the chocolate gets soft and smears. And the sucrose and non-crystallizable sugars must be in balance so that the centers will not fall in and have hollow bottoms. Centers should not have a high free-moisture content which will cause sugar or fat bloom.

Moisture in the center, starch, and surrounding air should be balanced so that a predetermined quantity of moisture will leave the center and form a thin dry skin to protect it from sticking during transit to and storage in the center room.

This skin will avoid necessity of leaving on the centers loose starch which must be brushed off on the feed belt to covering machine. Where necessary, the starch should be caught in a vacuum hood and carried to a collector.

Few centers benefit by lying in starch over 24 hrs. None benefit by staying there longer than was originally intended. The predetermined time will be affected not only by the composition, but by the type, size, atmospheric condition, etc. There are few pieces which cannot be made so that they come out in from 25 min. to 24 hrs. Each will have its best time, but should have a tolerance of from 2 to 4 hrs.

It is possible to keep good grade creams, caramels, or marshmallows in starch from Thursday to Monday with no apparent harm if proper precautions are taken. Addition of a humectant is apt to increase the weight but is a safe practice. The starch room should be cooled to 50 or 55 F. and humidity allowed to rise as the temperature falls.

In case of prolonged storage (24-48 hr.) a sheet of wax paper laid over each tray, in close contact with the centers, will provide sufficient protection against drying out.

It is best to have three rooms: (A) One at 50 F. and about 50% R.H. in which to hold over soft centers. (B) Another at about 70 F. and dry for hard candy. (C) A third at the same temperature, but with a higher humidity (say 50% to 60%) for centers that must not dry out.

Running cold centers may cause delayed bloom. Hot centers must be cooled before the chocolate can set. And if the coating does not bloom, it is almost certain to lose any markings put on it, foot out at the bottom and lose gloss. A very short tunnel may call for cold centers. But in that case, they are run under a heating element just before they go into the coater. The center surface is between 70 and 75 F., which prevents chilling the chocolate before it has taken its initial cooling. Then the coating is cooled from both sides and sets rapidly.

Melted untempered, or partly tempered, chocolate should never come in contact with surfaces below 70 F. (probably 72 is better) until such time as the chocolate has lost its "wet" look. The center room should deliver centers to covering machines at 70 F., or very close to that. The humidity should suit the centers. The skin must not be dissolved nor must the center dry out.

NEW CENTER FORMER

Centers can be vacuum-formed directly on a bottomer for immediate

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an outstanding improvement in

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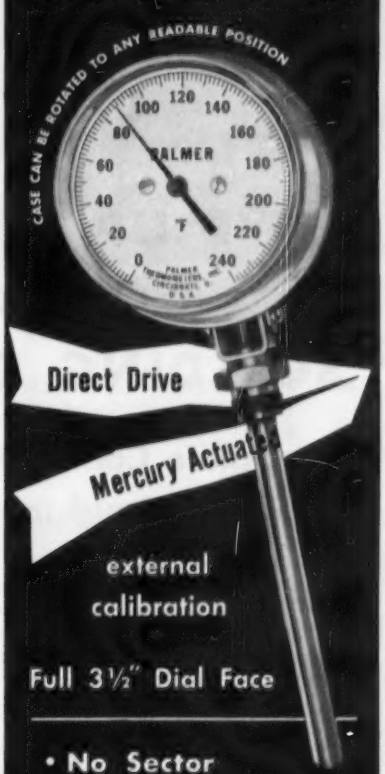

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- Easier and faster picking
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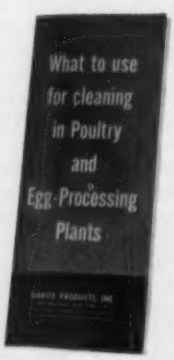
Oakite Composition No. 53 is approved by U.S. Poultry Inspectors. Non-toxic, it costs from 1 to 3¢ per 100 birds in most plants. Through its use the daily cleaning of scald tanks is made much easier.

For complete details, contact your nearby Oakite Technical Service Representative. Or write for FREE poultry cleaning guide. No obligation. Oakite Products, Inc., 26G Rector Street, New York 6, N. Y.



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coating by a rotary molding machine (Rotary Machine Co., Inc.). A 32-in. unit deposits 1,800 or 1,200 pieces (32 per lb.) per min., or approximately 2,500 lb. per hr. Machine handles cream centers, fruit paste, fudges, grained nougats, divinity, soft wet coconut types, etc.

Material is hopper-fed to a revolving drum with a series of vacuum cups.

Centers are then ejected in rows onto a belt that transfers them to bottomer of the coating machine.

VERSATILE MOLDER

Although it formerly handled only hand-roll fondant, the Friend machine has been developed for such other products as peanut butter, coconut, marzipan, kernel paste, soft nougat, soft fudges, and cut (as well as flowy) marshmallow. In other branches of the food industry, it is used for such products as ice cream, meat cakes, fish cakes, gefilte fish, and cookie dough, according to A. D. McCulloch, Harry L. Friend Co.

Machine operates on the simple basis of placing product in a chamber, exerting a slight push on top of batch and then releasing it. Desired amount of product is extruded through many orifices in the die plate directly beneath the batch. Receiving tray, which has already risen to height of the piece, is lowered simultaneously with the cutoff, thus forming the finished center of the confection.

MOLDY BARS

An unusual formation of molds under the coating of coconut bars made by a manufacturer who takes pride in plant cleanliness was reported by H. B. Cosler, Quartermaster Food & Container Institute.

This manufacturer now plans to heat any part of batches of coconut carried over from the previous day before molding into bar shape. And he intends to steam mixing and molding equipment before starting the day's production.

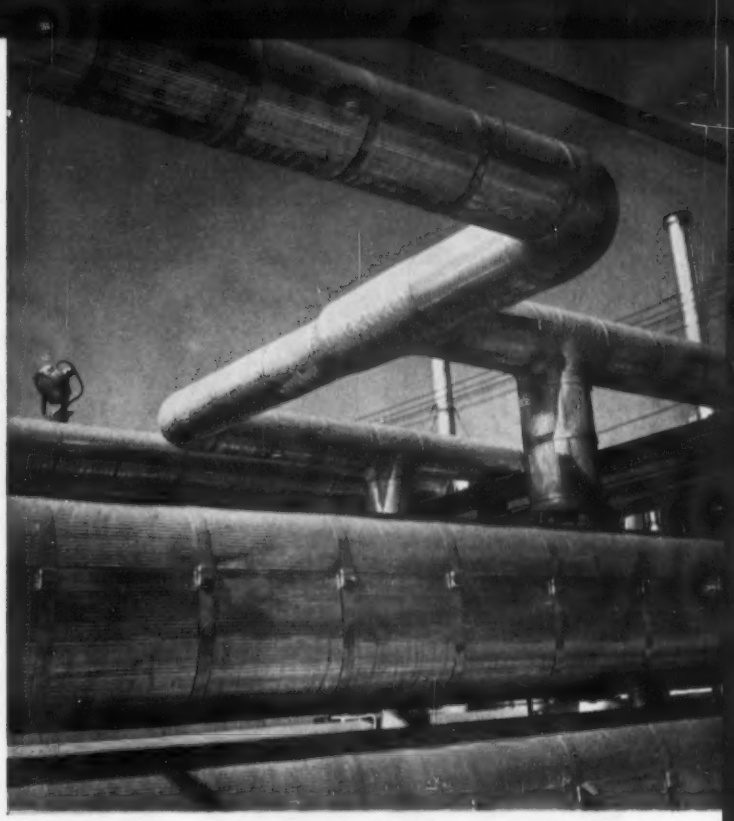
Safe time and temperature requirements to kill mold spores are 360 sec. at 140 F., 99 at 150, 54 at 155, 28 at 160, 15 at 165, and 8 at 170 or higher.

Properties of high-conversion corn syrup and its use in making different types of confections were discussed by J. A. Kooreman, and this paper will be presented in a subsequent issue of FE.— The Editors

End (Resume reading on page 59)

How Olin Mathieson Uses Childers Jacketing For Insulated Lines

Jacketing problems at new plant ranged from covering tall towers to irregularly-shaped heat exchangers. Read how aluminum jacketing solved these problems.



More than 244,000 square feet of Childers .006" Jacketing and 35,000 square feet of heavy weight Childers Jacketing was used in this new Olin Mathieson plant to weather-proof insulated lines, towers and vessels. Close-up above shows how aluminum jacketing was applied with strapping and seals.

Low first-cost, long life, and easy installation were the big reasons Olin Mathieson Chemical Corporation used Childers Aluminum Jacketing for outdoor insulated lines in their new Brandenburg, Ky., petrochemical plant.

Mathieson used Childers standard weight Jacketing on their insulated lines. Heavier weights of Childers Jacketing were used on high towers and vessels where a stiffer material was needed to support the vertical weight of the jacketing.

Engineers report that Childers Jacketing is inexpensive to apply. It comes in easy-to-handle rolls 4 ft. wide and 100 ft. long. Just pliers and a pocketknife are the only tools needed to apply. And because the jacketing is aluminum it needs no painting . . . stays clean and new looking even after years of service.

Childers Jacketing is easily removable, too. Just remove the strapping and jacketing can be taken off for inspection of the lines. Then same jacketing can easily be put back on the insulated line.

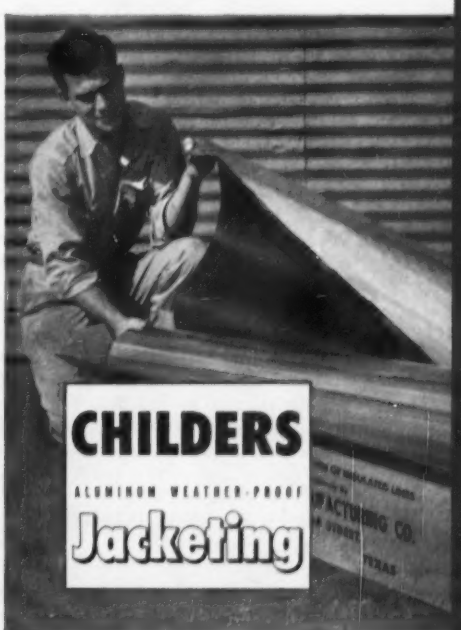
Immediate shipment from our large factory stocks can eliminate costly delays in construction or plant improvement schedules.

Try this low-cost protection in your plant. Write today for engineering data and information. You can order a 400 sq. ft. roll to test on one of your insulated lines. No obligation. Address: Childers Manufacturing Company, Department FE-11, 3620 West 11th St., Houston, Texas.

How to apply Childers Jacketing:

1. Best method of attaching jacketing is aluminum strapping and seals. Strapping can be pulled plenty tight with pliers like this. Other method is to use sheet metal screws.

2. A two-man crew can apply jacketing fastest. No special shop work or roll forming is necessary. Only tools needed are a pliers and a screw-driver or wooden wedge.



Each roll of Childers Jacketing comes individually packed like this in a heavy corrugated carton. Rolls are 4 ft. wide. With moisture barrier attached they are 100 ft. long; without moisture barrier they are 200 ft. long. They are well protected for field storage if kept dry. Individual boxes are light enough for one man to handle. (Adv.)

NEW PACKAGES & PRODUCTS

EXPOSITION HIGHLIGHTS: Top (l. to r.): First food package use of Mylar as a window in macaroni carton, new cheese culture in foil carton, and heat-and-serve nut trays. Above (l to r): Foil-capped sherbet cups, plastic sifter top for cans, and collapsible metal tubes for anchovy paste and jellies.

Film and Foil Star at Packaging Show

The debut of Du Pont's tough new polyester film as a packaging material for food was one of the many highlights of the recent Packaging Exposition in Chicago. Macaroni is reported as the first food product to use the film, and is now on sale in attractive windowed cartons.

Advantages of the film are strength and durability, transparency, chemical resistance, water-vapor-resistance, and stability under a wide range of temperatures (—80 to 300 deg. F).

The film is particularly valuable in packaging items with an extended shelf life or ones which must undergo rough handling. (146A)

Among new packaging ideas for the popular aluminum foil:

Bettman Nut Co., New York, is packing its Full House brand selected and mixed nuts in a foil tray closed with a windowed paperboard lid. Package is not only attractive, but offers a novel heat-and-serve feature. Each tray holds 6-oz. of nuts in a cellophane bag (double-wrapped in summer).

Kraft Foods Co. displayed both a new product and package. A new semi-soft cheese, Nuworld, is being marketed by the processor under a special arrangement with the developers of the cheese, the Universities of Wisconsin and Minnesota. Creamy-white in color, the cheese resembles bleu in flavor, but is an entirely new culture.

Package for Nuworld is a wedge shaped foil box holding 4-oz. of cheese. The cheese is coated with wax before being placed in the foil tray. Printed in dark green, black, and silver, the triangular lid also serves as the label. It is flange sealed by an automatic closing machine made by Ekco Foil Container Div., Chicago. (146B)

Merle E. Hanson, Inc., Chicago confectioner, is packaging chocolate and fudge in aluminum trays. Using the Candy Cottage brand name, the candy is packed in 12-oz. and 1-lb. sizes.

Foil is used for the cap on attractive sherbet cups used by Bowman Dairies, Chicago. A waxed paper cup holds 3-fl. oz. of fruit sherbet, with a crimp-sealed foil lid. Machine for filling the cups was developed by Standard Packaging Corp., Chicago. (146C) The machine automatically dispenses, fills, and applies the cover-all cap.

Zippered Coffee Bag

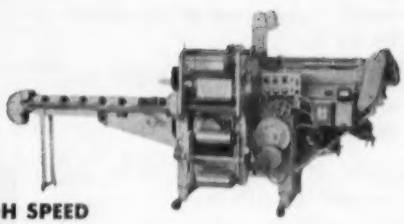
Cain's Coffee Co., Oklahoma City, licked an unusual materials handling problem with use of a zippered coffee bag displayed by Bemis Bag Co., St. Louis. (146D) .

The laminated paperlined textile bag filled the need for a reusable container to carry roasted coffee beans from the roasting and grinding plant in Oklahoma City to a packaging operation in Tulsa. The container is waterproof and economical since each bag is good for about 60 trips. Used for coffee, it protects aroma and flavor, as well as preventing contamination.

A cellophane bag with a string on

PROTECTED BY RIEGEL

POUND PACKAGE OF SOUTHERN BISCUIT FFV SALTINES CONTAINS FOUR ¼ LB. UNITS, WRAPPED IN A RIEGEL "TAILOR-MADE" WAXED GLASSINE.



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DOW CORNING SILICONE DEFOAMER

Use the space now wasted on foam to increase your output by as much as 100%. For example:

- **production of vacuum concentrated food product increased by 60%**
- **refinery still through-put increased from 1500 to 2500 barrels per day**
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And you get increased production immediately without installing expensive new equipment. All you have to do in the case of most foamers is add a few parts per million of the water dilutable Antifoam AF Emulsion or, where solvents can be tolerated, a dispersion of Antifoam A. Both of these Dow Corning silicone defoamers are physiologically harmless. Both of them **increase production • reduce processing time • eliminate the waste and fire hazard of boil-overs.**

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top was displayed by Geveke & Co. (148A). Made on the manufacturers Renka machines, the bag reduced waste due to tearing, and adds a reuse factor. The bag styles range from 2x3½ in. to 13x22 in.

Gold and Silver Casings

Reported as the first metallic colored plastic food casing was Tee-Pak, Inc.'s gold and silver Saran casings. (148B). Developed by the Chicago supplier, the casings are made in either roll or tube form. Both are used in club packaging. The double-wound casings employ Tee-Pak's patented Unilox printing process in which the ink is laid between two layers of plastic.

Over 30 chub packages per minute is the output of machines exhibited by Kartridg-Pak Machine Co., Chicago. (148C) Peanut butter, cottage cheese, tomato paste, and gelatin salads are packed in the aluminum clipped Saran pouches. Sizes range from 4- to 16-oz. units.

Flexible tubes made a renewed bid for food packaging under the sponsorship of the newly formed Collapsible Tube Manufacturers Council. (148D) As part of a campaign, tubes of apple jelly were distributed at the Exposition. Reported as an ideal package for viscous foods like peanut butter, mustard, cheese, and cocktail spreads, the metal tubes are currently being used for anchovy paste by four processors.

The companies: Vittoria Importing Co., San Francisco; Penn Food Distributors, Philadelphia, Rafco, Inc., New York City, and Vita Food Products, New York City. Tube openings are slotted for decorating.

Fitting snugly into the recessed end of a modified can is a plastic pouring disk developed by American Can Co., New York City. (148E) Held in place by an inward flanging of the double-seamed top edge of the can, the disk has a wedge shaped opening and a cluster of small holes. Contents may be poured or sifted after the can is opened with a standard beer can opener. The patented disk is available in a wide range of colors.

Luxury Carton Stock

A new high-gloss folding carton stock was displayed by S. D. Warren Co., Boston. (148F) The stock offers a glossy surface on pliable, semi-bleached pliable kraft board. Ideal for de luxe packaging, the surface is receptive to both high-gloss and metallic inks.

Circle Key Numbers on Reader Service Card

Mayonnaise Freezer Jars

A bid for greater consumer appeal for their line of mayonnaise and salad dressing has been made by Durkee Famous Foods with the adoption of specially-designed 12- and 24-oz. freezer jars.

Sturdy and air-tight, the jars have straight sides and openings that extend the full width of the jar. Reusable, the shape of the jars permits easy removal of frozen foods.

Labels did not change, though the screw cap closure emphasizes the handy shape of the container.

Toasted Macaroni Product

An unusual dietetic food, Toastaronies, are being marketed by Toastaroni, Inc., Joliet, Ill. Made of wheat and soy flour, the product is toasted and has a protein content of 20 per cent. Each serving holds only about 150 calories.

The Toastaronies are prepared by boiling in water for three min. and may be used in any ordinary macaroni or spaghetti recipe. They may also be eaten direct from the package since they are cut in short lengths.

Sturdy Produce Carton

A combination shipping and display carton constructed of Lawrence Paper Co.'s FreezurBoard, is claimed to offer many distinctive advantages to produce men.

Called Conveno-Pak, container is the latest in the Jayhawk line of corrugated board products developed by the company.

The result of extensive research, Conveno-Pak is a die-cut, sloping sidewall, self-locking top and bottom container that reportedly eliminates the waste shipping and storage space inherent in the old-style baskets.

Cube-shaped with flattened corners, the carton has sturdiness and lends itself to compact packing. It is filled upside down, assuring a full display surface when the lid is removed.

The half-bushel size weighs 1 lb., 10 oz., but will take a constant top to bottom pressure of over 600 lbs. without wall fracture. This gives it better stacking ability than the basket, and reduces shipping weight.

Circle 149A on Reader Service Card

Instant Chocolate Milk

Newest addition to the Carnation line is a chocolate-flavored instant milk product. The powder is prepared in the same way as the dairy's milk product.

Printing Costs..... $32[illegible]
Wrapping Materials.... 2500.00
New cost — $1250.00
50% savings in materials!

"JUST ONE REASON WHY
we're using CAMPBELL WRAPPERS
throughout our bakery chain!"

PRESERVES OVEN FRESHNESS — *Prolongs shelf life.* Positive heat or glue and crimp sealing insures sealed in freshness — prolongs sale life of cakes, cookies, crackers, donuts, rolls, pies and other specialties.

SEALS IN FLAVOR — *Increases repeat sales.* Customers can rely on the distinctive flavor of your products always being up to your standard when package-sealed on the Campbell Wrapper.

WRAPS WITHOUT DAMAGE — *Reduces dealer returns.* Cream-filled cookies, pies, or crisp crackers and other products are wrapped without breakage by the exclusive Campbell "float" wrapping method — regardless of product's shape.

HIGH SPEED — *Increases production at lower cost.* Campbell Wrappers are precision made for fast, steady operation — Wrap from 100 to 300 single or multiple item units per minute.

USES ALL WRAP MATERIALS — *No stiffeners unless desired!* Paper, cellophane, polyethylene, foils, and all the new plastic films may be used. Modernize your packaging methods now — Write for complete information.

SAVES LABOR — *Requires no skilled help.* Equipped with automatic feeds, one person often tends and operates several Campbell Wrappers at one time.

Write for this Campbell wrapper booklet — showing how it packages and the wide variety of products it wraps.

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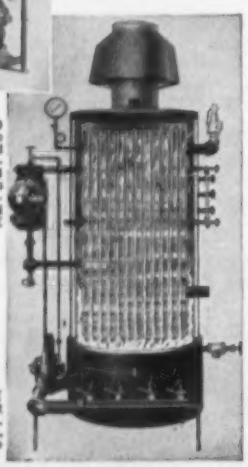
The KANE BOILER PACKAGE includes: the correctly sized Automatic Gas-Fired Boiler complete with gas burner and controls to maintain required steam pressure; and an M-K-O Automatic Boiler Feed system designed to return condensate and supply make-up water as required for highest operating efficiency.

"Engineered Steam at its best, with over 50 years of experience at your disposal!"

Full details in new KANE Bulletin, No. 2K.



The M-K-O Automatic Boiler Feed returns condensate and supplies make-up water as needed to the KANE boiler.

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Wax Dip Preserves Frozen Meats

Frozen Beef, Veal, Lamb, and Luncheon Meats are hermetically sealed in a thin coating of plastic wax through a process developed by M. E. Wallis Plastic Wax Co. Waxed meats are now being distributed by supermarket chains in Chicago, St. Louis, and central Ohio. Process uses a machine manufactured by Greer Equipment Co. and a microcrystalline wax developed by L. Sonneborn Sons, Inc., New York City. The thin coating makes it possible to keep meat fresh, juicy, and colorful for a week or longer under normal refrigeration, and for much longer periods when kept frozen.

Circle 150A on Reader Service Card

Game for the Gourmet

Descendants of the Malayan Fighting Cock, Rock Cornish Game Hens are being raised and processed by Idle Wild Farm, Pomfret Center, Conn. The unusual game birds are packed and shipped in squab size and a larger size that serves two people.

The squab size weighs approximately 14 oz. and is packed in a polyethylene bag closed with a cry-o-vac metal clip.

The larger size, weighing up to 20-oz., is processed in two styles, boned, and boned and stuffed. The boned hen is packed on a red plastic contour tray which is overwrapped with polyethylene. The stuffed hen is filled with wild rice, mushrooms, diced ham, bread, butter, spices, 21 Sauce Maison and cognac.

Meat of the hens is all white, including the drumstocks. The meat is not stringy but firm, finely-grained and tender. Flavor is delicate and slightly sweet.

Fifteen to 20 thousand of the hens are packed and shipped each week at the Connecticut Farm, reported as the originator and exclusive processor of the game. The product is shipped in dry ice to points all over the United States.

Each hen is readily identified by a small wing tag. A booklet containing recipes by famous chefs is sealed in a polyethylene pouch attached to each bird. For shipping, birds are packed in colorfully labeled cardboard boxes.

Food for Older People

Introduction of a line of geriatric products has been announced by H. J. Heinz Co. Representing a reported "first" in the industry, the foods for older people will be marketed as Senior Foods. Products will feature high protein, calcium, and iron content, low-caloric count, and will be made without salt.

The result of five years of intensive research, the canned products will initially include beef, lamb, and chicken stew. The line will be expanded to include other foods, particularly desserts. Package will be an 8¼-oz. can, providing individual servings.

Market tests are scheduled for Cincinnati and St. Petersburg.

Cookie Treasure Chest

An attractive and useful container for biscuits is being offered to bakers by I. D. Co., New York City. Called Treasure Biscuit Barrels, the cans are decorated in green, lavendar, and gold with a buccaneer motif.

Inside the lid is a moisture-absorbent material that keeps contents crispy and dry. Changes in color of the visible material indicate when the dessicant should be removed and dried.

The barrels are 6⅞x8⅛x8 in. deep.

Circle 150B on Reader Service Card

New Product Shorts

Dietetic Corn Flakes are being marketed by Van Brode Milling Co., Inc., Clinton, Mass. Cereal is low in sodium and contains no salt. Corn flakes, rice puffs, and rice flakes are made.

Frozen Beef Sticks are a new product of Mickleberry's Food Products Co., Milwaukee. Ten of the lean sticks are packed in an overwrapped chipboard carton.

Cranberry-Orange Relish is packed by Ocean Spray. The fresh frozen product is packed in cans with the popular lengthwise label.

Miniature Marshmallows are a new product of Kraft Foods Co. The marshmallows are designed for use in hot beverages.

Chicken Noodle Dinner is latest addition to line of Gerber Baby Foods. Distribution will be national.

—*End*—

Engineering New Product

—*Continued from page 47*

two fillets, and remove bones and discolored areas. Waste skin and bones are discarded. The fillets then are placed on an 8-in. Neoprene belt, which takes them to the mechanical cubing station.

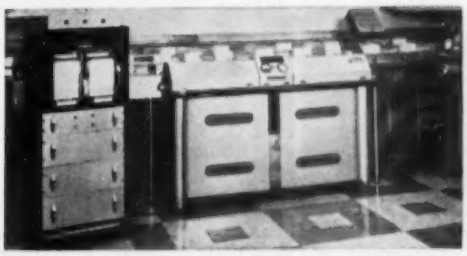
Movement of this belt is controlled by the woman feeding the fish-cutter. As she requires fish, she pushes the switch with her knee, whereupon the belt moves its load onto the feeder table of the cuber.

The cuber consists of two sets of 8-in.-dia. thin-steel gang knives, turning continuously at 70 rpm. As a fillet moves through the first gang knife, it is sliced lengthwise into strips ¾ in. wide. This first cutting completed, the belt, which is synchronized with this operation, automatically stops as the second set of knives goes into action.

Set at right angle to the conveyor belt, these knives cross-cut the fish into ¾-in. cubes, with no flaking and least shredding. The solid cubes from this operation give the product eye-appeal, and they easily withstand the trip along the conveyors to the filling machine without disintegrating.

When the cross-cut knives retract, the belt starts moving again. Thus, more fish slices are brought into position for this second cut, while the first fish cubes are discharged. Belt movement is regulated by a Reeves variable speed unit and is synchronized with rate of canning line.

The cubes drop from the belt to a short (6 in. by 3 ft.) proportioning conveyor. Baffles, arranged along this belt, provide a uniform flow of salmon to the 16-in. Neoprene main feed conveyor.



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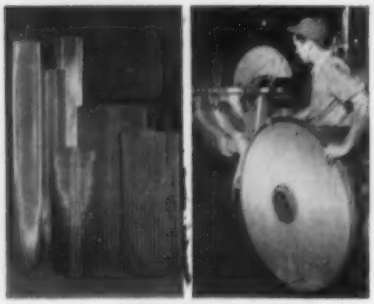

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WIRE CLOTH | METAL CONVEYOR BELTS | SPECIAL METAL FABRICATIONS

OFFICES IN PRINCIPAL INDUSTRIAL CITIES

Frozen peas, supplied in 60-lb. bags, from 0-deg.-F. cold storage, are dumped into the hopper of a Chisholm-Ryder Even-feed unit. The hopper has a helical-screw delivery in its throat, providing an even spread of product over the width of the adjustable discharge and into measuring pockets.

In order to meter the peas through this opening accurately, five pockets have been welded onto a drum at the discharge end of the screw. This drum operates at 23 to 30 rpm. Each pocket collects 2 oz. of peas—enough for a can—and discharges them through an adjustable gate. This spreads the peas over the main conveyor without product damage. The addition of these measuring pockets also eliminates the formation of ice, which formerly blocked the discharge opening.

Dry macaroni (90 lb. batch, dry basis) meanwhile has been put in a perforated basket and pre-cooked just enough to make it pliable, wash out some of the starch, and have it absorb 2½ times its weight in water. Chilled and washed, the macaroni is dumped into another Even-feed unit.

Whereas peas are hard-frozen, the macaroni is warm and soft. And it can become sticky and thus difficult to handle. So the type of screw-delivery used in the pea dispenser would not efficiently handle the macaroni, because the product would adhere to the screw and clog it.

To solve this problem, paddles (2 in. by ¼ in.) have been welded onto the spiral. The paddle-equipped screw moves the macaroni along without packing and efficiently discharges it onto the belt. In addition, a water fog is sprayed across the top of the hopper to moisten the macaroni sufficiently so its mechanical handling is improved.

Baffles are arranged along this main, inclined belt for further proportioning of the salmon, peas, and macaroni being conveyed to the Food Machinery Corp. filler.

Ingredient Procedure

Meanwhile, measured amounts of cottonseed oil and monosodium glutamate are filled into empty cans going to the filler. Supply of the latter is from a 30-gal. jacketed container located just above the unit. Cold tap water is circulated to maintain the MSG solution (1 lb. of MSG per gal. of water) at a temperature to prevent bacterial acidity.

The liquid flows from the container through 1¼-in. Tygon tubing to a metering valve mounted directly above the can line at a point where the empty cans approach. This valve consists of a stainless steel rotating housing in which is bored a cylinder equipped with a free reciprocating piston.

The housing's rotation is timed to the can drive and it turns 180 deg. as each can passes under the valve. The cylinder is filled with 1 cu. in. of the MSG solution when the piston is at bottom position. At this point it has just discharged solution into a can.

Each time the cylinder moves 180 deg., the piston falls to the lower end of the cylinder, assuring complete emptying of the contents and effecting closure to permit refill.

Oil is likewise dispensed, with dairy valves and Tygon tubing being used throughout the entire oil supply line.

After the cans receive the proper amount of salmon, macaroni, and peas, they move on a chain conveyor under a pipe that supplies running water to fill them to an approximate head space. Dry salt is added by a dispensing machine. And after topping for uniform headspace, the can enters a steam-flow closing machine. Closed cans are then washed and jumble-packed in retort baskets, mounted on dollies.

Retort-Basket Trick

These are 25 case-capacity baskets. They are fabricated of standard expanded metal sheets that formerly formed the bottoms of retort trays. Four of these 20 in. x 36 in. sheets are joined together at the corners by three welded rings to make the four sides of the basket.

This assembly is placed on a dolly, the top of which forms the basket's bottom. When not in use, the sheets are easily folded and set aside.

To eliminate excessive moisture absorption by macaroni, which would result in a mushy product, the filled baskets are moved on rails into a retort for cooking at frequent intervals. The product is cooked at 240 deg. F. (10 psi.). Then it is water cooled to 100 deg. F., labeled, and cased.

Cartons meanwhile have been prepared by cannery workers during spare time. Each knocked-down unit is opened and placed over one of ten wooden mandrels. The bottom is glued with a special adhesive that dries within 3 min. as the case is held in place by a 15-lb. weight, hinged to the wall. By the time the worker has placed and glued ten cartons in this manner, the first one has dried, and is taken off.

Cartons are stacked twelve high for coding and casing. The day's requirement of 400 can be produced in this manner within 2 hr., and at a cost less than that of stapling.

End *(Resume reading on page 48)*

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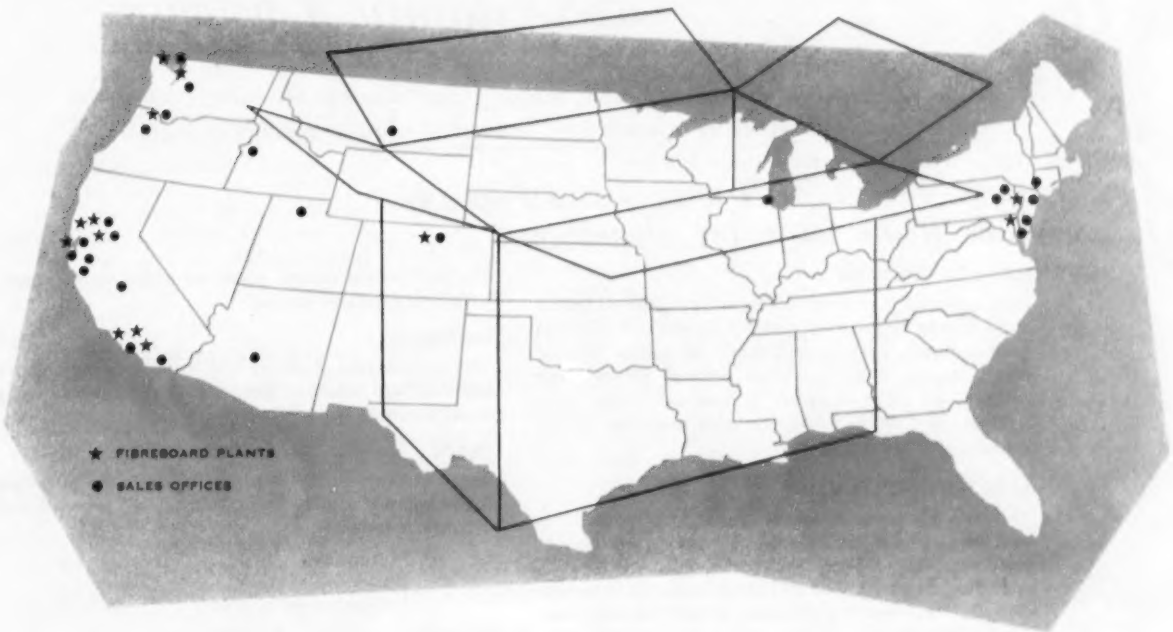

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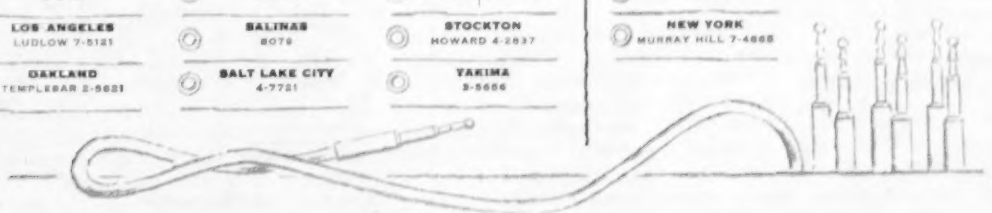

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IT'S NEW!

Beta 'Roche' CAROTENE

Gives foods true, natural yellow color and vitamin A potency

Processors of margarine, shortening, butter, cheese, yellow baked goods, confectionery and edible oils will be especially interested in the new and exclusive product of original Roche research: beta carotene 'Roche.'

Beta carotene 'Roche' has many advantages:

NATURAL COLORING

Beta carotene is the natural coloring matter of butter and other dairy products and is a constituent of cereal grains, alfalfa, carrots, and other vegetation. 'Roche' beta carotene imparts a *true* natural yellow color without any tinge of green. It does not change to a reddish color as do some vegetable pigments during storage.

ADDS NUTRITIONAL VALUE

Theoretically, one gram of pure beta carotene is equivalent to 1.67 million U.S.P. units of vitamin A. High retention of beta carotene-vitamin A activity is achieved in baked goods and other foods when margarine and shortening containing added beta carotene 'Roche' are used.

COLOR STABILITY

Extensive laboratory data show excellent color stability of margarine, butter, shortening, cheese, edible oils and yellow bakery products which were colored with beta carotene 'Roche.'

UNIFORMITY

The high degree of purity and color stability ensures uniform and constant intensity of color when using equal amounts per batch.

USAGE

Beta carotene 'Roche' is ideal for use in the following foods because it gives them *natural*, yellow color and vitamin A potency:

Margarine	Shortening
Butter	Cheese
Yellow bakery products	Confections
Edible Oils	

Detailed information about the application of beta carotene 'Roche' is available in a technical brochure. Ask your Roche salesman or write the Vitamin Division for this publication and for samples.

TECHNICAL INFORMATION

Crystalline beta carotene 'Roche' is in the all trans form

Empirical Formula: $C_{40}H_{56}$
Molecular Weight: 536.85
Melting Point: 183.0
Appearance: Red-violet platelets

Solubility in Edible Oils:

At room temperature	about 0.08%
At 60 C.	about 0.2 %
At 100 C.	about 0.8 %

Biological Properties

0.6 microgram beta carotene: 1.0 units of vitamin A
1.0 gram beta carotene: 1,666,666 + U.S.P. units of vitamin A

PACKAGING

33-pound steel pails, double Synthetasine lined, with removable-replaceable-leverlok cover.

3-pound triple-tite tamperpruf metal cans.

Batch size cans of Vitamin A and Beta Carotene 'Roche' blended in vegetable oil to your specifications.

24% Semi-solid Suspension of Beta Carotene 'Roche'
400,000 U.S.P. units per gram 'Roche' beta carotene in vegetable oils.

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ADVANCES IN TECHNOLOGY

Spraying Wheat for Rust May Effect Baking

Application of systemic fungicides to growing wheat may produce deleterious changes in the grain that reduce its baking quality.

Three such fungicides—calcium sufamate, Actidione, and sodium sulfamilate—were applied to Pawnee winter wheat twice during the 1954 growing season. All were effective in control of rust, and latter two produced wheats that performed satisfactorily in baking tests.

Flour from the calcium sulfamate-treated wheat, however, exhibited short mixing time and rapid breakdown of dough in comparison with the control. Loaves baked from the flour were small with tendency toward a more open grain.

It is believed that these results are due to basic changes in the wheat seed during the growing season—*Cereal Chemistry*, 208—11, May, 1955.

Diffusion Dehydrating Of Mashed Potatoes

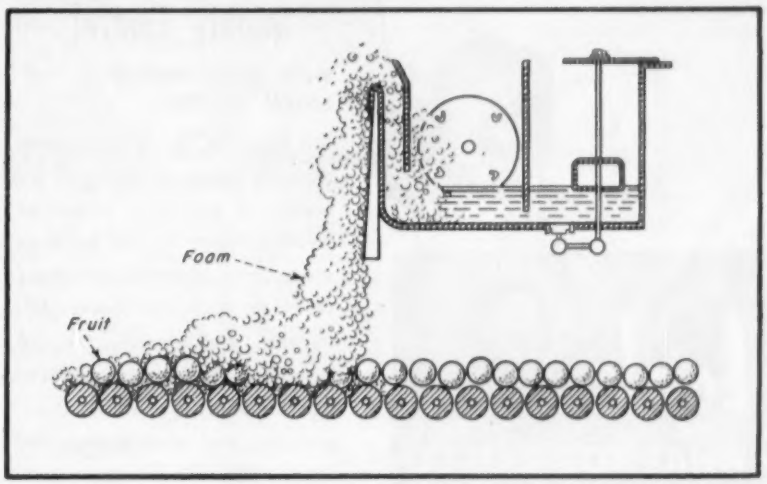
Transfer of moisture from cooked mashed potatoes through a container of regenerated cellulose is key-step in a patented process for making a dry granular potato product.

According to patent specifications, cooked mashed potatoes are made into a slurry with ethanol and then placed in a plastic container made of a thin sheet of regenerated cellulose. On exposure to air both water and alcohol will diffuse through the container, although most of the alcohol remains.

After about 60% of the water originally present in the slurry has been evaporated by diffusion, material is filtered and the cake is broken up and dried to form a free-flowing granular product.

Rate of dehydration of the slurry is proportional to temperature and surface exposed. For this reason, and in order to operate the process continuously, the preferred shape of the cellulose container is a tube in which the rate of flow is adjusted to achieve the desired degree of dehydration during passage of the slurry through it.

Process can be operated at a temperature between 75 and 175 F. in 1⅞ in. dia. tubes with walls 0.001-0.002 in. thick. Product is said to rehydrate to yield edible potato of pleasing color, texture and flavor—U. S. Patent 2,704,260, March 15, 1955.



Wax-Foam Coats Fruits & Vegetables

A novel method of applying a protective wax film to fruits and vegetables is the basis of a recent patent. The novelty resides in foaming an aqueous wax emulsion and allowing it to flow as a continuous curtain over the material to be treated.

Apparatus comprises a tank to contain the emulsion, means of maintaining the level in the tank, and means of agitating the emulsion with a beater that produces a foam (see illustration above). Latter flows over front edge of tank, being directed by a baffle, and down the front wall which is formed into a series of vertical ridges and channels. This construction aids in aligning the foam in a continuous blanket or curtain. Material to be coated travels on a conveyor beneath the tank and becomes completely covered with the foam, producing a unifrom protective coating—U. S. Patent 2,703,760, March 8, 1955.

New Fungicide Dip

Spoilage of oranges due to green mold can be prevented by dipping the fruit in sodium orthophenylphenate before packing and shipping.

In a commercial trial on 20,000 cases the estimated cost of treatment was only ⅞¢. Process is more effective than the borax dip; and after being used as a dip the solution is suitable for washing walls and floors of the packing plant, sterilizing machinery and field cases.

Principal disadvantage of process is that the solution burns the skin of some fruits, especially early Navel oranges. This can be overcome, however, by controlling alkalinity.

Recommended procedure is to pass oranges through a tank containing fungicidal solution and then through a water spray. Fruit is then dried.

The solution contains 2 lb. commercial sodium orthophenylphenate and 0.1 lb. caustic soda in 10 gal. of water. Desired alkalinity ranges from pH 11.7 to 12.0. Care must be taken to maintain the alkalinity, which has a tendency to drop. One hundred gallons of solution will adequately treat 6,000 cases of oranges—*Food Preservation Quarterly* (Sydney, Australia), 68-70, Dec. 1954.

Orange Juice Composition

Acidity, soluble solids content, and quality of extracted citrus juices will vary considerable according to efficiency of the extractor.

This is due to the variations in composition of juice depending on positions of the pulp in the fruit.

Analyses of juice fractions of Valencia oranges and lemons showed that the outer, or last extracted juice, is higher in sugar content—in oranges it averages 11%, in lemons less—than inner juice. Acidity of outer juice is considerably lower—in oranges it averages 72% of that in inner juice, in lemons 91%.

Also, outer juice is richer in flavor than inner juice—*Food Preservation Quarterly* (Sydney, Austrialia), 12-14, March, 1955.

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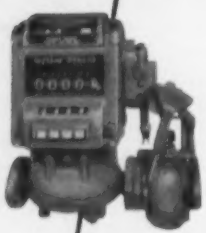

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Predrying Treatment Betters Dried Eggs

Chilling to a temperature of less than 40 F. before evaporation is the crux of a patented process for preparing a dried egg or citrus juice product.

According to the invention, fresh broken eggs are mixed with cool water, chilled to less than 40 F., and immediately subjected to a drying operation. This treatment yields a product with little or no adhesiveness or tackiness between the particles.

Atmospheric, vacuum, or spray drying may be used with equally satisfactory results. The drying temperature should always be below that which would coke or burn the mixture. A relatively high temperature, say about 350 F. may be used at the beginning of the drying operation, but it should be reduced to about 150 F. as the operation approaches completion. The practice of the invention with citrus juice is substantially the same as with eggs—U. S. Patent 2,699,996, Jan. 18, 1955.

Canning Bananas

Time of treatment and not temperature is the crux of successful banana canning by a recently patented process.

In the process, bananas are ripened by conventional methods to any degree desired. They are peeled and reduced to a pulp of such consistency that it can be pumped. During the process the puree is protected from exposure to air by flushing the equipment with nitrogen, CO_2, or other inert gas.

Banana pulp is pumped through tubular heat exchangers of small diameter in which the temperature is quickly raised to 240-300 F. Heating should be accomplished in approximately 6-sec., followed by holding for the same length of time. Puree is then rapidly cooled, and canned in an aseptic chamber in which the cans are finally sealed.

Temperature of the canned product should not exceed 100 F. It closely resembles fresh fruit in flavor, color and consistency, and is sterile by all recognized standards—U. S. Patent 2,702,247, Feb. 15, 1955.

Eight Factors Influence Choice of Detergents

Considering time and labor expended daily in cleaning operations in food factories, it becomes apparent that choice of detergents for different types of jobs is of paramount importance.

At least 8 factors enter into the scientific choice of such a product:

(1) Type of deposit to be removed; (2) chemical nature, and sometimes physical condition of the surface from which the soil must be removed; (3) method of applying, and extent to which hand cleaning is necessary; (4) time that can be allowed for efficient application; (5) type and quality of water available; (6) machine washing operations that may be included in the general cleaning process; (7) availability of heat to maintain highest efficiency of the solution, and (8) final bacteriological condition essential to the particular food processing operation.

Detergents used either in cleaning compounds or by themselves to accomplish the desired degree of cleanliness are grouped in three classes: *Strongly alkaline substances*—caustic soda, sodium orthosilicate, sodium metasilicate, trisodium phosphate; *Substances of moderate alkalinity*—siliceous silicates, sodium carbonate, sodium sesquicarbonate, disodium monohydrogen phosphate, sodium tripolyphosphate, soaps, and *Substances of near neutral reaction*—Sodium hexametaphosphate, sodium chloride, sodium sulphate, sodium suphite, sodium alkyl sulphates, sodium aryl-alkyl sulphates, ethylene oxide condensation products with fat alcohols, surface-active quaternary ammonium compounds. Detailed discussion is given to each of the eight factors and the indicated detergents—Food Manufacture, 204-06, May 1955.

Equipment for Tempering Of Plastic Chocolate

Apparatus has been patented for tempering thermoplastic materials, such as chocolate, in a continuous operation. It comprises two horizontal rotating hollow drums, the surfaces of which can be heated by circulating a tempering fluid. Drums are arranged one above the other, but not in the same vertical plane.

Material to be tempered is fed to a distributing head near one end of the upper drum and is spread uniformly over a predetermined portion of the surface. The chocolate adheres and is carried toward a series of plow blades extending the length of the drum surface.

Upon contacting the blades the chocolate is shifted longitudinally away from the feed end and carried as a plurality of spaced ribbons to the opposite end of the drum. There it is scraped from the upper drum and falls onto the lower one where the process of plowing shifts the chocolate to the opposite end where it is removed for further processing.

In this fashion the chocolate is formed as relatively thin ribbons on a large area of drum surface, and is repeatedly disrupted and agitated by the plow blades. The process effectively tempers the product and gives it uniform texture and composition—U. S. Patent 2,704,722, March 22, 1955.

High Storage Temperatures Injure Grapefruit Sections

For maintenance of original good quality in canned grapefruit sections, they should be stored at 70 F. or lower.

Selected samples representative of good Florida commercial pack of canned grapefruit segments were stored for 1 yr. at carefully controlled temperatures of 32, 60, 70, 80, and 90 F. to determine rate of degradation of flavor, color and firmness.

After 3 months, flavor of product stored at 90 F. was markedly different from the control stored at 32 F. Color and firmness showed changes in 3-6 months. At 80 F. sections remained good for 3-6 months, but showed marked changes in color, firmness, and flavor at 12 months. The 70 F. storage sample showed only slight changes.

A general trend was noted in the changes in pectic substances, although there was considerable variation among samples. Protopectin decreased with storage time and increased storage temperature. More water-soluble and polyphosphate-soluble pectins were present in samples held at higher temperature range.—*Food Technology*, 268-270, May, 1955.

Gel-Forming Mixture

Production of a single-package dessert gel of low-methyoxyl-pectin-calcium-salt type, soluble in cold water, is the claim of a recently patented process.

Crux of procedure is pretreatment of both ingredients to enhance rate of solution and hydration of pectin; give it slower reaction characteristics with respect to the calcium ions, and physically retard solution of calcium salt.

Pectin is modified by dissolving it in water with either of two classes of salts, or a mixture thereof, and drying. Preferred salts of 1st class are sodium citrate, acetate, and propionate. Their function is to delay formation of a gel and increase the rate of solubility of the pectin. Preferred compounds of second class are sodium hexametaphosphate and sodium ethylene diamine tetra acetate. Their function is to sequester calcium ions and hinder gelation of the pectin material. The dried product should pass a 65-mesh screen.

Pretreatment of the calcium salt (sulphate, citrate, phosphates, carbonate, and tartrate) consists in coating the particles with carboxymethylcellulose, gelatin, and with vegetable gums.

Coating process can be achieved in a number of ways, as by spraying the coating on the salt or mixing the salt with a solution of the coating material, evaporating the solvent and grinding the residue.

Final product is made by mixing the modified ingredients, and adding such other items as flavor and color to taste.

Typical formula: Modified pectin 3-8 parts; coated calcium salt 1.4 parts; citric acid 2-6 parts; sugar 75-100 parts; flavor and color to taste. When added to the appropriate quantity of cold water the mixture will gel in 1-30 min., preferably in 10—U. S. Patent 2,701,767, Feb. 8, 1955.

Copper Causes Browning Of Salt-Cured Fish

Experimental work has led to the conclusion that traces of Cu in the curing salts can cause marked superficial browning during the "wet stack" stage of salting white fish.

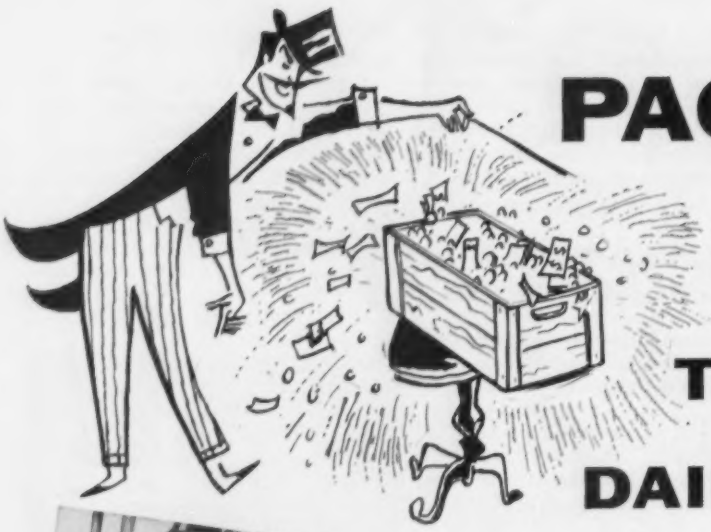
This positive result was obtained only after it had been shown that browning was not due to lack of Ca and Mg in the curing salt, nor to the presence of Fe or organic matter, living or dead.

It was found, however, that speed of development and intensity of browning varied with areas in which fish were caught. Cod caught in the Arctic browned more quickly than those taken from the North Sea. The role of Cu is still uncertain, but it seems likely that a chemical reaction of the Maillard type is responsible, and that Cu plays the part of a catalyst—*Food Manufacture*, 200-203, May, 1955.

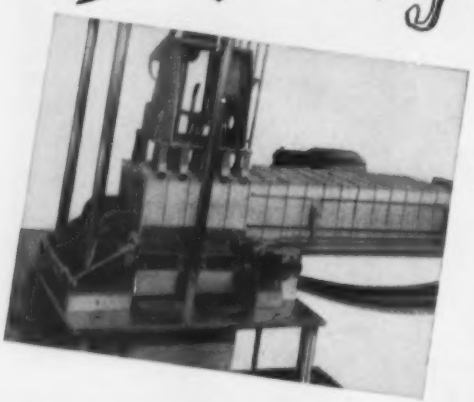
Puffed Cereal Products

Designed to overcome disadvantages of the explosive and radiant-heat methods of puffing cereals, a patented process puffs cooked doughs of any desired composition and shape.

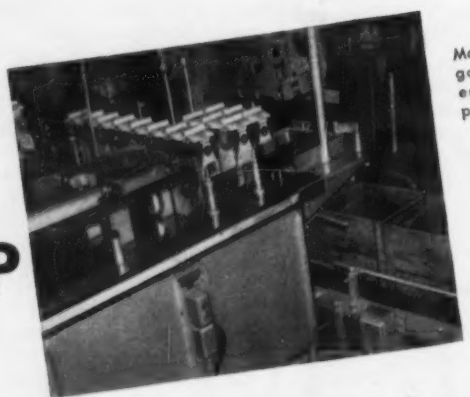
The material, containing 8-18% moisture is subjected to pressure between rolls heated to 500-750 F. This puffs it to a large volume in sheets, pellets, or other desired shapes depending on the shape of the rolls and the form in which the dough is fed to the rolls. Advantages are:



PACKAGING MAGIC THAT BOOSTS DAIRY PROFITS



Model 836 high speed caser for flat-top or gable-top fibre containers in quart, pint and ½-pint sizes.



Model 834 for flat-top or gable-top fibre containers in ½-gallon, quart, pint and ½-pint sizes.

AUTOMATIC CASING ON STANDARD-KNAPP EQUIPMENT

If you are using manual casing, compare your methods and costs with dairies employing Standard-Knapp automatic equipment.

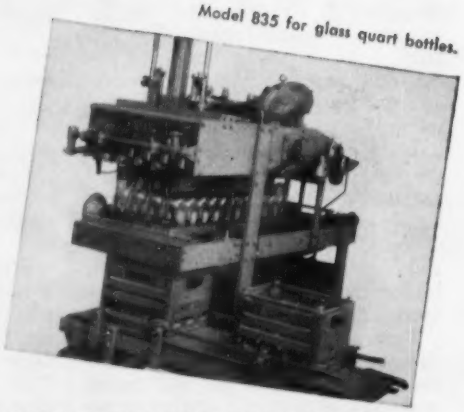
FIRST, IN SPEED — One automatic caser will load up to 12 cases per minute.

SECOND, IN PERSONNEL — As machine is automatic, manual assistance is not required. Valuable personnel are freed for more important tasks.

THIRD, IN DAMAGE TO CONTAINERS — The automatic caser does not tire. It lowers the carton gently into the cases with uniform smoothness at all times.

You no longer need or should pay the high cost of manual casing. *For the complete story, ask to see one of our representatives. For more details, write for our bulletins on AUTOMATIC MILK CASERS.*

Model 835 for glass quart bottles.



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STANDARD-KNAPP DIVISION OF EMHART MFG. CO. **PORTLAND, CONNECTICUT**

Inexpensive equipment, short time of exposure of the material to high temperature, and low maintenance cost.

Dough is cooked in a steam-jacketed vessel for 1-2 hr. with steam at 20 psi. Then it is shaped to desired form for puffing. Preheating is advantageous and may be done by radiant heat as the material is being conveyed to the rolls. Latter are maintained out of contact and may be separated by as much as ⅛ in.

A peripheral speed of 150-200 ft. per min. has been found satisfactory. The product may be dried to about 3% moisture if a long shelf life is desired. Otherwise further treatment is unnecessary—U. S. Patent 2,701,200 Feb. 1, 1955.

Effect of Temperature On Milk Plate Counts

Evidence that the present temperatures (32 or 35 C. for 48 ± 3 hr.) of incubation in the Standard Plate Count of Milk are reliable is contained in a report of the Committee of the Mfg. Section ADSA.

Studies were prompted by observations that lower temperatures and longer times occasionally detect bacteria unable to grow at standard temperatures.

At incubation temperatures from 10 to 45 C. for two days, 26 and 32 C. gave mean results of the same magnitude on raw milk, highest count for pasteurized milk was at 32 C.

A gradual increase in colony count was observed between 45 and 51 hr. Magnitude of difference was small, however, and dependent on care given to detecting smaller colonies at 45 C.

These results indicate that: (1) 32 C. is the logical temperature for both raw and pasteurized samples, and (2) use of 37 C. should be discontinued—*Journal of Dairy Science*, 499-503, May 1955.

Using Rotary Vacuum Filter For Making Bakers' Yeast

Decreasing rotational speed of a rotary vacuum filter drum, regulating the cake thickness, and filtering as soon as possible after centrifuging may increase solids content of bakers' yeast to a level only about 1-1.5% below that of the filter-pressed product.

Using a more porous cloth also improves the dryness, though it becomes necessary to recentrifuge the filtrate to recover yeast that passes through the cloth.

The apparent wetness or dryness of compressed yeast depends on the amount of extra-cellular liquid pres-

NEW NIAGARA

AIR CONDITIONED TEST CABINET

USES—to determine effects of controlled temperature and humidity conditions on test subjects of all kinds—to test processes—to find optimum conditions.

RANGE—With water and electric power services only, the range is from freezing temperature up to 150°F (dry bulb). With refrigeration, and using Niagara No-Frost Liquid to prevent freezing of sprays, you achieve dew point temperatures as low as minus 30° F. Control of relative humidity from 5% to 95% is obtained at all temperatures in this range. Air capacity is 200, 400 or 600 c.f.m.

METHOD—Air is saturated in the air-conditioning unit at the required dew point temperature and reheated to the desired dry bulb temperature. This is the method of the Niagara Type A Air Conditioner which has been proven for the most exacting duty over twenty-five years.

CONTROL—The dew point thermostat is located in the air stream, the dry bulb thermostat in the test cabinet. No moisture sensitive instruments are needed. Recorders may be used to obtain a complete record of conditions.

TEST CABINET—(inside) dimensions are 30" x 28" x 24" with access clear opening 26" x 22". Insulation is the equivalent of 4" cork.

AIR CONDITIONING UNIT is enclosed in an insulated cabinet adjoining the test cabinet. A door the full size of the cabinet wall gives complete access.

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ent, rather than on the total moisture content of the yeast. By adding a solute, NaCl for example, to the yeast cream before filtering, the liquid surrounding the cells may be made hypertonic to them so that the cells lose water to the extra-cellular liquid.

When such a "salted" layer moves into the washing section of the filter and is sprayed with water, the extra-cellular liquid becomes hypotonic to the cellular contents. Water is then pulled into the cells, leaving the yeast mass lower in extra-cellular moisture, and hence apparently dryer than yeast filtered without the salt treatment.

It is possible by this method (patented in Austria) to produce a very white, chalky yeast without interstitial moisture, hence having 35% solids or more.—*Mitteilungen der Versuchsstation fur das Gärungsgerwerben* (Vienna), Vol. 8, No. 11/12, 155-160, 1954.

Enzymes Inhibit Gelation In Frozen Egg Yolk

Papain mixed with fresh egg yolks in a concentration of 0.05% and incubated 15-20 min. at 75 F. before freezing prevents gelation of the frozen and thawed product and does not impart an off-flavor.

Tests conducted with a large number of proteolytic enzymes showed only papain, trypsin, and Rhozyme effective in inhibiting gelation during storage up to 4 months at 0 F. The latter two produced off-flavors and off-odors in the yolk.

Activity of the enzymes was not affected by temperatures as low as —90 F. They became active immediately on thawing the yolk and quickly produced odor and flavor changes. For commercial use, therefore, a method must be developed for inactivating the enzyme, either before freezing or during frozen storage. Very rapid freezing and thawing are also recommended—*Journal of Milk & Food Technology*, 77-80, March, 1955.

New *Clostridium* Medium

A simple easily prepared yeast extract medium (YESB) for counting *Clostridium* spores that gives results comparable to the modified Yesair pork infusion agar has been investigated.

New medium comprises per l: Difco yeast extract, 10g; BBL thioglycollate supplement, 5g; soluble starch, 1g; K_2HPO_4, 2g; agar, 15g. The pH is adjusted to 7.4 with NaOH prior to addition of agar. Separate sterilization of the K_2HPO_4 improves clarity of medium. When tubed (15-ml) 0.3

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POWELL LUBRICATED PLUG VALVES

FIG. 3059G—300-Pound Steel Flanged End Valve. Sizes 6" to 12".

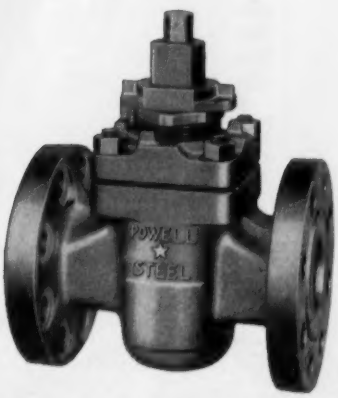

FIG. 1559—150-Pound Steel Flanged End Valve. Sizes 1" to 4".

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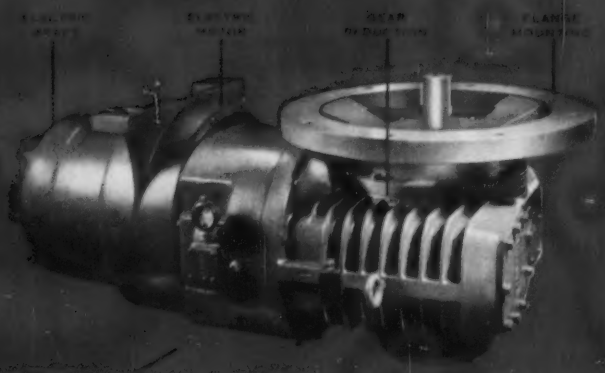

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ml 5% $NaHCO_3$ solution is added just before inoculation.

Test strains used were: *Cl. botulinum* (62A & 115B), *Cl. feseri, Cl. histolyticum, Cl. perfringens,* and Putrefactive Anaerobe No. 3679. Spores were suspended in sterile distilled water and mildly heated—75 C. for 60 min. Others were drastically heated—100 deg. C. Recovery counts in latter were comparable in both medium—*Food Research,* 9-12, Jan-Feb, 1955.

High Quality Frozen Beef Equals Chilled Product

Contrary to the widely held opinion that freezing has a deleterious effect on palatability of beef, a recent investigation indicates that, if the meat is initially of the highest quality, any deleterious effect of freezing is insignificant.

Current investigation was made on beef shipped from New Zealand to England and preserved by three methods: Chilling, freezing, and fast freezing. Object was to compare beef from animals at a high plane of nutrition, alike in breed, age, sex, and weight, and prepared under identical conditions.

During ocean transport chilled quarters were carried in 10% CO_2 at 29 F., frozen quarters at 14 F., and fast frozen eights at 13 F. On arrival in England the meat was cooked and tasted by two panels, one operated by the Ministry of Food. The two groups were supplied with meat cut from the same animals.

Conclusions reached by both panels in experiments conducted in two successive years, agreed very well—members were unable to detect any significant difference in flavor, juiciness, and tenderness of the three classes of meat. Results suggest that the supposed superiority of chilled beef over frozen is due to the initial high quality of the meat and not to the chilling process—*Food Manufacture,* 187-89, May, '55.

Antibiotics Seen Cutting Yeast-Culture Time

Tests with Polymixin B have shown it to be successful in eliminating bacterial contamination from bulk pitching yeast. It is suggested, that this and/or other antibiotics may replace the time-consuming single cell isolation technique now used to prevent contamination in the small amounts of yeast that are to be used for inoculating a plant propagator—paper by Earl L. Van Engel and H. T. Czarnecki presented at Amer. Soc. Brewing Chemists meeting, Philadelphia.

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- No capillary attraction for moisture, hence doesn't rot, swell, warp or support bacterial growth.
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Questions & Answers

THIS MONTH'S PROBLEM

Water Softening Problem

Question—A few years ago we installed a wood cooling tower and closed circuit recycling system to cool the water for our cooling canals in our cannery. Soon, we experienced scaling in the system, which our laboratory analyzed as calcium carbonate. We put in a zeolite softener and eliminated the scaling. But now we find that the wood in the cooling tower is showing signs of deterioration. We are also troubled with spongy porous deposits, which seem to be highly insulating. Can you suggest corrections for these operating difficulties?

Trouble With Labels

The Question was—Is there any foolproof mechanical or electrical device that we can install in our cannery to prevent wrong labels from getting on cans when different products are being simultaneously handled in the same size cans?

Answer—We understand that a very clever device was developed to apply a magnetic code to a can in somewhat the same fashion as a magnetic tape recorder functions. This code could then actuate a pick-up device, which is mounted at the labelling machine. It could check each can and signal entry of an improperly coded can—one containing a product different from the one set up on the labelling line. While this development was worked out in one location, the device does not seem to have been offered commercially on a wide scale as yet.

We suggest that if you have recurrent complaints of mis-labelling, make a careful analysis of your labelling operation to discover just what goes wrong in your particular case. It is quite likely that if more than one product is being handled, and more than one cage dumping and labelling line is in operation, an occasional cage of one product is dumped on the wrong line. Although the cans carry embossed end codes, it is possible that they may not be noticed, or may be misread.

Since, in all probability, you do not have many possible combinations that are produced simultaneously in similar cans, it should not be difficult to work out a system of tagging each crate with a large identifying symbol that could not possibly be mistaken for anything else. The tag could carry a distinctive color for each product. Or, if you have any problems of colors fading, or of personnel who lack sufficient color perception, you might prefer to designate each product by a tag of distinctive shape.

Tagging each crate is necessary. A system depending upon tags placed on one product and left off another suffers the danger that a tag left off accidentally, or detached, will signal a false product identification.

How Would You Do It?

Readers are invited to submit to FOOD ENGINEERING answers to question, "This Month's Problem." Selected answers will be published with credit (unless you specify otherwise). We pay space rates.

What is *Your* Problem?

Subscribers also are invited to send in food engineering questions. We undertake to provide answers, free to the best of our ability. We do not undertake costly investigations. Give full information and your name. Your identity will not be disclosed.

Write to Questions & Answers Editor, FOOD ENGINEERING, 330 W. 42nd St., New York 36, N. Y.

Ice Cream Mix Formula

Question—We are a specialty food house, distributing chiefly to hotels, restaurants, and institutions. In the near future, we would like to market a powdered ice cream mix. Do you have a formula and direction for preparing this item?

Answer—Preparation of a powdered ice cream mix starts with production of a good liquid mix, which is then concentrated to between 28 and 36% total solids and then spray dried.

In preparing the mix, milk products are combined with 10 to 25% sugar. The mixture is pre-heated to at least 170 deg. F., and held at this temperature for 20 min. Following drying, a stabilizer and remainder of the sugar (in granulated form) are mixed with the spray-dried product. Mix may be reconstituted with cold water, using approximately 7 pints of water to 4.25 lb. of mix.

Since there are so many variables involved in making an ice cream mix, we will not attempt to furnish you with a formula. If, however, you are interested in a basic formula, please provide us with the following information: Percent fat desired in the finished ice cream; sources of dairy products—cream, butter, plastic cream, skim milk powder, skim milk, whole milk, skim condensed, and whole condensed (in this case we will need the percent fat and total solids)—and sweetened condensed. With this information we will be glad to furnish you several basic mixes.

Other sources of information are two bulletins published by the USDA, Bureau of Dairy Industry. One is BDIM-Inf-74 (April 1949) Dried Ice Cream Mixes. The other, BDIM-Inf-11 (August 1945) Commercial Ice-Cream Formulas. The latter gives formulas for different fat content mixes containing from 10 to 18% butterfat, and made from all types of ingredients. We think you'll find them of great help.

Choosing Lift Trucks

Question—We are considering the purchase of a fork-lift truck and have been looking around at several different types being offered. We have noticed that some have the regular driver's seat, while others are designed for operation by a standing driver. We are wondering what the relative advantages and disadvantages of these two main types may be.

Answer—It is almost impossible to say that one or the other of these types is the better without knowing the particular conditions under which the truck will be used in your plant. You see, the two types exist because there are certain places where one is preferable, and others where the other type would be more satisfactory.

One of the main advantages of the stand-up truck is the ease with which it can be mounted and dismounted. It has found favor in operations where the truck driver is required to get off and on frequently—as, for example, when he must select merchandise for his loads, or perform some other duties beside just driving the truck. These stand-up trucks are generally built with the operator's platform quite close to the floor, so that stepping off and on involves a minimum of physical effort. This is an important factor in reducing operator fatigue over the length of a working shift.

Another advantage in the stand-up design is that if the truck has to be driven backward, it is said to be easier

Q.—What's the difference between diabetic and dietetic foods?

A.—Diabetic foods have a low carbohydrate content, especially in sugar. On the other hand, dietetic foods have a low calorie content.

Our Flavors Are Tailor-made and Tested to Insure You a Better Tasting Product

Oftentimes a food, dessert or beverage product requires some special taste or seasoning effect that cannot be achieved through the use of available flavors. In such instances, our laboratories study the manufacturer's requirements and prepare custom-made compounds designed to meet the desired specifications. These materials are then exhaustively tested in our Experimental Food Laboratory (above) where, in laboratory controlled batches, they are incorporated in the actual finished goods. Rigid taste and shelf tests follow. When perfected to our laboratory's satisfaction and submitted for approval, these tailor-made flavoring specialties usually represent a precise fulfillment of the customer's needs. . . . Why not join the many leading manufacturers who have availed themselves this service by consulting FRITZSCHE . . . *A FIRST NAME IN FLAVORS SINCE 1871.*

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HOW GORTON'S CUT PACKAGING COSTS

...GOT HIGHER OUTPUT IN LIMITED SPACE.

This operation has been set up to use minimum space for its 90-package-a-minute average production. Cartons formed in the right foreground are filled on the packing table (background), and pass quality control inspection (foreground) prior to being automatically closed and wrapped (left).

Pre-cooked fish stick packaging at Gorton's Gloucester plant is an excellent example of what careful planning can do to boost output and lower costs. Space was a problem here from the start. Yet in this limited area, the use of automatic high-speed packaging machinery makes possible the average production rate of 90 neat, attractive Gorton's packages a minute.

A Tray-Lock machine forms cartons automatically, delivers them right-side-up to the filling table. Low-cost, die-cut blanks feed in from a magazine; no attendant is needed. After cartons are filled and inspected, a PC Closer tucks and closes top automatically as they pass to the wrapper. Here the versatile Model FF Wrapper gives tight, attractive wraps at any speed. Only one operator is needed. Special features—like paper feed stopping automatically when no package is fed—mean trouble-free operation and the day-to-day efficiency that helps keep output up and costs down.

Whatever your packaging problem, the man to see is a Package representative. He can recommend the equipment best suited to your specific needs, make sure you get high-speed, cost-cutting performance and the most up-to-date packages for your products. Phone or write him at one of the offices below.

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for the operator to watch where he is going than if he has to turn around on his seat and crane his neck. Here, again, the advantage would seem to lie in reducing operator fatigue, and perhaps also improving the safety of the operation.

The sit-down truck is still predominant and, of course, great improvements have been made in recent years in the comfort factors of its design—foam rubber-seat cushions and the like. It would appear that for regular operation, where frequent mounting and dismounting is not required, the driver would be more comfortable and, therefore, more efficient, to ride sitting down than standing all day.

If you decide that a stand-up truck is better for your plant, it might be well for you to arrange a demonstration in order to obtain driver reaction. You might find a problem on your hands if you already have sit-down trucks and add a stand-up truck without fully considering this important factor.

Testing Grind Size

Question—We have been producing a fairly coarsely ground peanut butter, but note that many brands now on the market seem to be much finer ground. However, in attempting to measure the fineness of grind, we have run into a problem. If we de-fat the butter with a solvent, dry the meal, and try to sift this meal through a series of test sieves, we find that static charges build up and prevent a clear-cut sieve separation. Is there some way to analyze these fine butters for particle size?

Answer—Many of today's fine or "creamy" peanut butters are ground to permit passage of over 95% through a 200-mesh screen. It is understandable that you might encounter difficulty when dealing with such a fine meal.

An alternate method of particle-size analysis is available to overcome this problem. In fact, it has been used for exactly this purpose, according to the Agricultural Research Service.

Test is carried out in this manner: First, select your series of test sieves covering the pertinent range of particle size. (The A.R.S. used U. S. Standard Series, from No. 20 to No. 400). Next, for each screen make up a slurry of 5g. of peanut butter in 100 ml. of commercial hexane, and pour this slurry through the screen. Finally, determine percentage of meal left on each test screen, on an oil-free, dry-weight basis. Thus, you will be able to determine the particle-size distribution for the sample in question.

We suggest you note the importance of relatively small percentages that may be retained on some of the coarser screens, even though the bulk of the material passes through an exceedingly fine one. Considerable variations in texture of finished peanut butter are said to derive from these coarser fractions.

Another point we suggest checking is the particle shape itself. This is easily done by microscopic examination of a portion of the various screen fractions. This examination may give you clues as to kind of milling action you'll need if you decide to go into this type of product, and will aid you in discussing your equipment requirements with mill manufacturers.

Possibly the best solution, though not the cheapest, would be to install a bank of infra-red lamps at the entrance of the cooler, to sterilize the caps by radiant heat. This type of heating is very easy to control. In fact, it can be cut off in case of any line interruption in order to avoid any localized over-heating. On the other hand, initial installation of several kilowatts capacity with switches, etc., is rather costly. Thereafter, you will have not only the added operating expense of the electrical energy consumed, but also the replacement cost of lamps.

These lamps must be mounted quite close together in order to insure adequate heating of every jar. As a result, they will operate at a relatively high temperature and have a correspondingly short life.

Q.—How much edible oil is in grape seeds? And is its recovery practical on a commercial scale?

A. — Oil content of grape seeds ranges from 12 to 22%. As far as we know, there was no commercial recovery of grape-seed oil prior to the last war. However, wartime shortage of edible oils stimulated production of considerable amounts of refined, bland, grape-seed oils. We've been informed that grape-seed oils are recovered by either pressing or solvent-extracting. Widely employed in Europe is the trichloroethylene-extraction technique.

Candy Trouble

Question—Will you furnish us a formula for making peanut brittle of very high quality, using brown or raw sugar. What could be accomplished flavorwise by using part, or all honey, in place of corn syrup? If honey should be used, as part of the invert, would it be added with the glucose, or later in the cooking process? If we should use a little open kettle Louisiana molasses for flavor where should it be put in the batch?

Answer—To make a high-grade peanut brittle, bring to a boil: Liquid sugar, 26½ lb. and corn syrup, 10 lb. Then add Spanish peanuts, 14 lb. and cook to about 290 deg. F.

Now add 10 oz. of dairy butter and cook to 295 deg. F. Remove from heat to stop boiling, and add 6 oz. bicarbonate of soda and salt to taste (about 1½ to 3 oz.). Stir until soda is well mixed and batch becomes fluffy. Pour into oiled slab and spread thin.

When batch is cool and stiff enough to handle, cut into pieces of convenient size, and stretch to thinness desired. Then when batch becomes brittle and cool, break into pieces suitable for packing.

Brown sugar may be substituted for half of the sugar to provide a characteristic flavor, but with slight loss in dryness.

Invert sugar, honey, or molasses may be substituted for up to one-third of the corn syrup, and they should be added toward the end of the cooking along with the dairy butter. Only one of these ingredients should be used in any one batch and each will impart a characteristic flavor. Use of any of these items will result in loss of shelf-life due to hygroscopicity (increased stickiness), and they should be only used for local distribution in localities of low relative humidities.—*Justin J. Alikonis, Al-Chem Laboratory, Inc., Bloomington, Illinois.*

Sausages Spoiling

Question—Occasionally, we run into a color problem with our fresh pork sausage links, which are stuffed in sheep casing and then cellophane-wrapped in 1-lb. packages. Shortly after the sausages leave our plant, gray spots, about the size of a dime, develop on the surface. In instances, this discoloration penetrates the meat. At first, we thought that this discoloration was attributed to mold growth. However, laboratory examinations proved that this was not so. This trouble occurs intermittently, and it is evidently due to something occurring irregularly. We are dry-ice packing samples of these discolored sausages for air-mail delivery to you. Will you check them and offer us what suggestions you can to overcome this problem?

Answer—Samples of sausage links submitted definitely indicate discoloration attributed to air pockets.

This difficulty is attributed to careless operation of the sausage stuffer. Evidently, the stuffer is not being filled

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properly. As a result, air is entrapped with the sausage.

We suggest you slowly load the meat into the stuffer, and then pack it down tightly.

Another thing. Check the piston gasket inside the stuffer to make certain it does not let air get into the meat.

Preparing Thuringer

Question—Can you tell me how I can go about making thuringer?

Answer — The following formula may be used as a starting point, and varied to suit individual tastes or conditions—

Grind 30 lb. of beef trimmings twice through a ⅛-in. plate. Now add to the ground beef: Regular pork trimmings, 7½ lb.; pork cheek meat, 7½ lb.; beef hearts, 5 lb.; salt, 1 lb. and 11 oz.; sugar, 4 oz.; white pepper (ground), 3 oz.; white pepper (whole), 1.5 oz.; saltpetre, 1¾ oz.; and mustard seed (ground), ¼ oz.

Mix batch well, and spread in pans (8 in.) in a cooler (36-38 F.) to quick chill. Stuff tightly into a fibrous casing, taking care to avoid air pockets. Hang from loop on sticks, and hold

Q.—We've been unsuccessful in making Sucaryl-sweetened, low-calorie soft drinks with a good body.

A.—You can prepare smooth, natural mouth-feel beverages by using a hydrophilic colloid, like algin, pectin, methoxycellulose, or carboxymethylcellulose, as a bodying agent. We have also learned that these colloids improve carbonating ability of the beverages.

24 hr. in 36-38 F. cooler. Then hold 1 hr. at room temperature before hanging 40 hr. in 80-F. smokehouse. Finish off by raising smokehouse temperature to 90-110 F., and hold for 6 hr.

Hang overnight in dry room, keeping sausage covered with canvas or burlap (to protect from draft). After sausage cools to 60-65 F., remove to 34 to 36-F. cooler, and hold for shipping. Keep at about 70 F. for 12 hr. after removing from cooler and before shipping.

Special Turkey Items

Question—Can you furnish me with directions on how to prepare: (1) Boneless roast turkey meat for smoking, and (2) jellied turkey-meat loaf? Both products are to be sliced for use.

Answer—As for the first item, rub turkeys with a mixture of salt, pepper, and paprika. Then roast in an oven until the meat is sufficiently tender to be removed from bones. You can, if you wish, pre-steam the birds to shorten roasting time. Make certain that you don't roast giblets with the turkeys.

Now bone-out turkeys, string-tie meat into a roll, stuff in stockinette and smoke.

Of course you'll have juices that cook out during roasting. And your only economical course is to prepare a gravy from this juice.

Formula and methods of preparing the turkey loaf vary greatly, depending upon the quality of product desired as well as consumer taste.

To make this loaf item, first plunge birds (in perforated cages) into sufficient boiling water to cover them. Bring water to a boil, and simmer until meat is tender enough to remove from bones, and collect the broth.

Cooking time, of course, is related to size and quality of the birds. However, you may, if you wish, pressure-cook the turkeys at 240-250 F.

De-bone the turkeys, then chop or cut meat into desired size pieces.

Next, prepare the jelly by adding 10 lb. of high grade gelatin to 42 lb. of cold turkey broth. Sprinkle gelatin into center of broth, and let stand until it absorbs the liquid. When all broth is absorbed, place vessel in tub of hot water until gelatin broth reaches 160 F. (no higher, otherwise gelatin will lose its binding power).

Now add to gelatin broth: Salt, 1¾ lb. and white pepper (ground), 3¾ oz. You might also want to put in a little sage.

Mix 65% chopped turkey meat with with 35% gelatin-broth solution. Then pack into metal cooking molds used in sausage plants. Form into loaves by chilling in a 36- 40-deg.-F. room.

Discoloration Trouble

Question—Could you suggest what agent might be added to grated potatoes to prevent them from discoloring. Purpose is to extend shelf-life of our frozen pancake mix.

Answer—Without laboratory testing, it is difficult for us to offer suggestions, especially in the case of a product that we've not yet seen on the market.

However, you well might consider sulfur dioxide, which acts both as an enzyme inhibitor and antioxidant in arresting discoloration. Also ascorbic acid is a second possibility.

So we advise carrying out experiments by adding sulfur dioxide to your potato-pancake mix in 25 or 50 ppm. amounts and up to a maximum of 500 ppm. Hold the sample mixes under typical refrigeration for maxi-

mum shelf-life anticipated. Then fry the pancakes, follow with a test for residual free SO_2, and evaluate by taste-test. Meanwhile, have readers any other suggestions?

Frying Noodles

Question—We manufacture food specialties such as crackers and soup mixes and would like to get into the production of chow mein noodles. Can you give us a formula for the dough and advise us of the steps involved in producing this type of fried noodle? We have made several experiments of our own. However, something seems missing—either in the type of flour used or in the manner of making the dough.

Answer—Since you have not furnished us with your formula and production steps, we cannot advise you of your mistakes.

Nevertheless, here's a simple formula and directions for making delicious, crisp brown fried chow mein noodles—

Mix to form a smooth dough: Flour, 71 lb.; eggs, 14½ lb.; water, 14½ lb.; and salt, 1 lb. and 14 oz.

Roll out dough very thin, partially dry and then cut into thin strips. Dry the noodles and deep-fat fry at 375 deg. F.

Sales Promotion Query

Question—We would like to enhance sales of a product presently packaged in a glass jar by offering a premium inducement for a limited time. Our problem is to find an easy and inexpensive way of attaching something to the jar to feature this offer. Have you any suggestions?

Answer—There are, of course, several ways this might be accomplished, but your emphasis on economy will probably govern your final choice.

One of the easiest is to apply a separate sticker, or self-adhesive label, to the jar which carries all necessary copy to describe the offer. This can be manually applied if only a limited number of jars is involved, or by a special machine if the volume is large.

An advantage of such a label is the ease with which it can be stripped from the jar if you should want the customer to mail it in to secure the premium. It is also a simple matter to remove any such labels from jars on store shelves at the expiration of the special offer if it has a time limit.

If the offer covers a big enough volume of jars to warrant it, another way of presenting it is by using a specially-lithographed jar cap carrying the desired copy. It is thus given great prominence. Obviously, though, it does not have the advantages of the sticker—mailability and ease of removal of the offer from store stocks if desired.

A printed inner-seal under the jar cap is another possible way of providing the copy and a mailable attachment in one. It is relatively inexpensive, and can be applied automatically on filling lines. Of course, it cannot be removed when the offer expires.

Possibly one of the simplest and least expensive methods is to use a slightly larger label than normal, with the extra area in the form of an unglued flap carrying the premium offer copy. The manufacturer of your labeling machine will doubtless cooperate with you in working out the necessary details of slight changes to label boxes, label pickers, etc. to handle the oversize labels. Except for this minor expense, there is practically no additional cost involved as no extra operating labor is needed on the line.

By keeping the premium offer area unglued, it becomes very easy for the purchaser to detach and mail in the tab. Similarly, it can readily be removed from store stocks at the expiration of the offer.

There is one possible drawback that can be overcome by exercising caution—the tendency of the unglued tabs catching and tearing during filling and subsequent operations. You will probably want to experiment a bit on your own lines with various size dummies before printing your special labels.

Q.—How'll I make date and coconut spreads.

A.—First try mixing equal parts of sugar with finely ground dates or coconut. Then, if you wish, vary the amount of sugar to suit your requirements.

Cooler Corrosion Difficulty

Question—We have a serious corrosion problem in our unit coolers, which must be replaced sooner than we wish. Coolers are galvanized. In operation, air is fan-forced over cooling coils, where brine is recirculated from bottom pan to nozzles that spray it over coils to prevent frost build-up. Have you any suggestions on how we can check this corrosion?

Answer—We suggest that you hot-dip galvanize the coolers and use stainless steel scrolls, eliminators, and fan wheels. Also, you can add to your brine solution an economical, odorless, and non-toxic inhibitor. Perhaps best to use are phosphate-silicate or orthophosphate-boron mixtures, added at the rate of ½ to 1 lb. daily per cooler.

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Managing a Company

CASE STUDIES IN INDUSTRIAL MANAGEMENT *By J. M. Juran and N. N. Barish. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York City 36. 1955. 9¼ x 11¼ in., leather, ring bound. Price:* $4.50.

Tracing in detail the operations of one company, the Burndy Engineering Co., this book is designed to provide the reader with a working text for all phases of management. The sample company's design, manufacture, and sale of its product; its personnel relations; the cost time, and quality control measures; the firm's maintenance program; and financial planning, are all dealt with in detail.

Illustrations provide practical examples of the necessary paperwork and chart various procedures.

The book is divided into sixteen sections covering the company, its organization, product development, plant location, manufacturing planning, plant layout, purchasing, receiving, storing, and inventory control. Also, production, quality, cost control, plant maintenance, sales management, employment, selection and training, industrial compensation, collective bargaining, and top management planning and controls.

The sample company is well chosen as one which deals in most of the problems existing in present-day industrial management. The book will provide an interesting and educational over-all view of management to members of specialized branches, and will serve as useful text for those planning expansion or initial operation of a company.

On Softening Water

SOFT WATER IN MODERN USE *by Dr. Cornelia A. Tyler. Published by Water Conditioning Research Council, 111 W. Washington St., Chicago 2, Ill. 1955. 48 pages, 6¼ x 9 in., paper. Price:* $2.50.

Outlining the differences between hard and soft water, this book details the advantages of soft water, with treatment of its benefits in pipes, boilers, and hot water heaters.

Principal methods of softening water are discussed, with emphasis on the "cation-exchange," the most popular domestic process. Advice is presented on the use of water softening equipment.

Book is of use to those concerned with the problems of hard water purification.

Pocket Emulsion Guide

PRINCIPLES OF EMULSION TECHNOLOGY *By Paul Becher. Published by Reinhold Publishing Corp., 430 Park Ave., New York City 22. 1955. 149 pages. 4¾ x 7 in., cloth. Price:* $2.95.

Directed at chemists who are interested in learning more about theoretical and applied emulsions, this book is the fifth in the publisher's handy and timely Pilot Series. Little that is new will be found in the section of the book dealing with applied problems, since the author intends the book to serve as a guide to emulsion technology and present principles in terms of practical problems.

Chapters are included on dispersions and emulsions, surface activity, the theory of emulsions, emulsifying agents and equipment, emulsion formulation and properties, and demulsification. A list of general references and an index are included.

Guide to Food Science

HANDBOOK OF FOOD AND AGRICULTURE *Edited by Fred C. Blanck. Published by Reinhold Publishing Corp., 430 Park Ave., New York City 22. 1955. 6¼ x 9¼ in., cloth. Price:* $12.50.

Food chemists, technologists, and students will find this book of particular value, since it provides an accurate and detailed picture of the newest applications in the field of food science.

Illustrated and data-packed chapters present the latest developments in food processing, nutrition, food preservation, packaging, and waste disposal. Carefully selected references provide an aid to further research on the subjects.

The book covers a broad range of topics, and so is at its best when used to obtain a view of the food and related agriculture industry as a whole.

Technology of Oleo

MARGARINE *By A. J. C. Anderson. Published by Pergamon Press, 122 E. 55th St., New York City 22. 1955. 327 pages. 6¼ x 9¾ in., cloth. Price:* $9.80.

This book is directed at answering the need for a reference work on the science and technology of the greatly expanded margarine processing. The rapid growth of the field, along with its many new advances, makes this up-to-date treatment welcome and important.

In his first chapter, the author presents a history of margarine, covering

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6. Book of Flowsheets $2.00

Few copies of 1949 edition still available. It contains 130 process charts covering a wide variety of food manufacturing operations. Charts are accompanied by brief descriptions of the processes.

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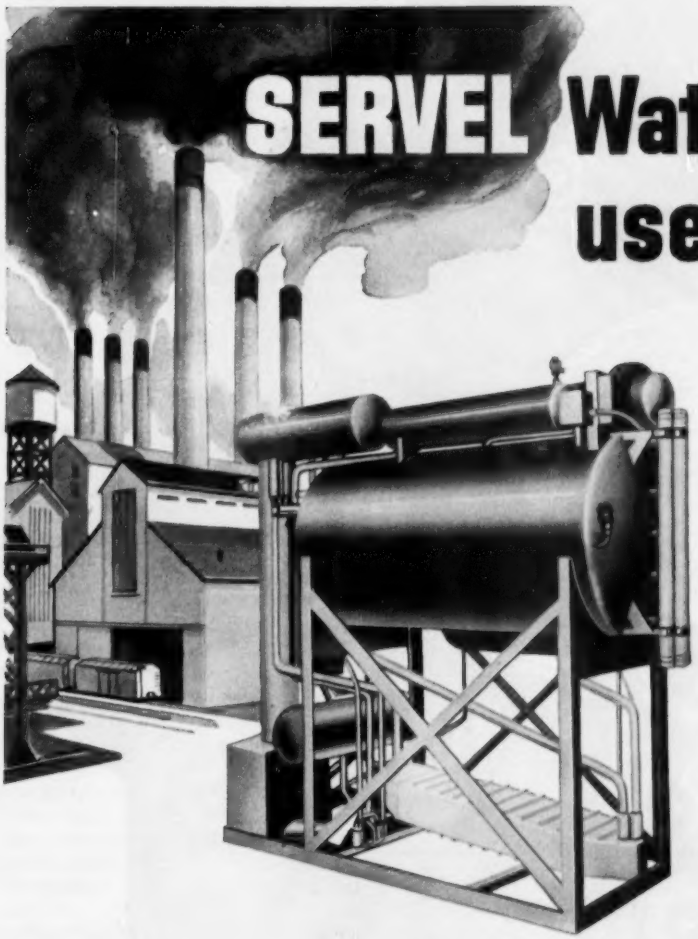

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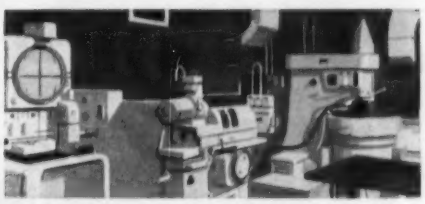

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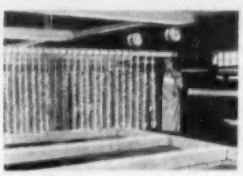

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The fourth section covers storage and preservation of margarine, while the fifth one deals with process control. This last is subdivided into chemical, bacteriological, and yield controls. The two remaining chapters are concerned with international margarine laws and plant layout.

Guide to Refrigeration

AIR CONDITIONING, REFRIGERATING DATA BOOK — APPLICATIONS, *Fifth Edition, By Harold H. Hendrickson. Published by American Society of Refrigerating Engineers, 234 Fifth Ave., New York City 1. 1955. 984 pages. 6¾ x 9 in., leather. Price: $7.50.*

Written by 89 experts, this fifth edition of the popular work contains 61 authoritative chapters. Material on precooling produce and fishing vessel refrigeration has been added. And the chapters on breweries, fisheries products, and refrigerated warehouse design have been entirely rewritten. Most remaining chapters have been revised, some extensively, to bring the information up-to-date with latest practices.

The volume includes layout information, formulas, tables, diagrams, and sample engineering calculations in factual handbook style. Aiding the reader are 343 illustrations and 104 tables. The classified section lists manufacturers of components and assembled units of refrigerating and air conditioning equipment.

This work is seen as particularly interesting and useful to engineers, managers, consultants, and other executives in the food industry..

Booklets and Reports

CONSULTING SERVICES (1955). *Published by Assn. of Consulting Chemists and Chemical Engineers, New York City 17. 144 pages, paper. Price: $1.* Alphabetical and geographic listing of member services for all industries.

CHEMICAL INDUSTRY FACTS BOOK, *Second Edition. Published by Manufacturing Chemists' Assn., Inc., Washington 6, D. C. 148 pages, paper. Price: $1.* Basic reference source on chemical industry. Illustrated with charts, graphs, and tables.

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INNOVATIONS IN APPLE HANDLING METHODS AND EQUIPMENT. *Published by USDA, Washington, D. C. 89 pages, paper. Price: $.50. Illustrated, report deals with research carried on in State of Washington.*

ASSURING THE COMPANY'S FUTURE TODAY (*No. 175 in General Management Series*). *Published by American Management Assn., New York City. 28 pages, paper. Price: $1.75. Timely* report on company survival and growth in an expanding economy.

BOOKLETS AND PAMPHLETS ON THE MEAT PACKING INDUSTRY. *Published by Institute of Meat Packing, University of Chicago. 27 pages, paper. No charge.* Bibliography of reports and books published by various sources.

—*End*—

Maximum Process Heat

—*Continued from page 73*

tube, about four stories high, through which air, heated to 270 F., is fan-blown upward at high velocity. Salt is fed into the bottom (through a star feeder) and carried up with the air, being dried in the process. Falling into a separator and conveyed under magnets for removal of any metallic materials, it is weighed continuously, and classified into four sizes—fine, medium, and coarse flakes, and also H_2O softener—and bagged for shipment.

Air is removed from the trump dryer by another fan that forces it through a reheating coil and on to above-mentioned Oliver filters.

Packaging Granulated Salt

In addition to bulk, product from vacuum process is packaged in many forms and sizes. Also, a number of special ingredients are added. Examples are potassium iodide (to make iodized salt), and calcium silicate ("free flowing" salt).

These special products are proportioned into a measured stream of dried salt by Omego feeders. Thorough mixing is insured by use of a 65-ft.-long screw conveyor that moves the product to bins to feed filling machines.

For household use, the various salts are filled into 26-oz. round and square paperboard containers, 5-lb. Delta Seal cartons, and 5 and 10-lb. cotton bags. The 26-oz. containers are filled on high speed units, then automatically wrapped, cartoned semi-automatically, sealed, palletized, and moved to storage or shipping by fork trucks.

Two other specialty items: Brine buttons and 50-lb. blocks are made on special presses. Blocks are automatically formed in five "flavors"—plain, iodized, sulfur, blue (trace mineral) and 'kooler'—on a 750-ton hydraulic press. In their manufacture, bulk salt is conveyed from a special storage silo to an automatic scale that weighs 50-lb. batches. Scale discharges into a "cement mixer", and added ingredient (when used) comes from a small feeder.

After a predetermined time, mixer empties into block press, a small amount of water is added, and pressure is applied. Then the above cycle is repeated. And another charge is ready by the time the block is pushed from the press.

Brine buttons are made from bulk salt continuously on a small press.

Flour salt is further screened and conveyed to the bagging station. Also bagged is bulk salt in a number of "flavors" similar to those used in blocks, brine buttons, and iodized salt.

End (*Resume reading on page 74*)

More and Better CO_2

—*Continued from page 68*

loaded with any particular impurity (and activated carbon is very selective in its action towards different compounds) then some odor will carry over and be removed at the second stage. This will allow the nose to detect an odor difference between the interstage and the outlet taps.

When this occurs the charge of carbon in the first stage is discarded. The second stage charge is moved to the first stage, and the empty canister is refilled and placed in the second stage. In this way only small quantities of new carbon are used and yet there is no dependence upon inefficient plant reactivation methods.

Additional odor sampling stages are also spotted on the control panel and at the purifiers so that monitor checks of the purity may be made at any time.

And still further precautions are taken. The gas finally passes through LeVal porous stone filters just ahead of the points of use to insure removal of solid particles such as carbon dust or pipe scale that may have been picked up in the lines.

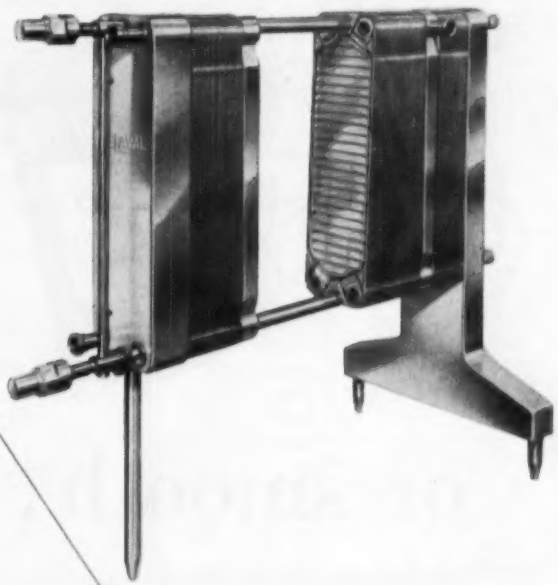
Finally, the gas goes through a pressure-reducing station. Here, of course, the gas pressure is reduced to the extent required at varying locations throughout the brewery.

A dial-type flowmeter, located on the control board, indicates amount of purified gas being used by brewery. This gage, which measures gas usage in lb.-per-hr., permits the operator to provide for load peaks.

End (*Resume reading on page 69*)

CHECK POINTS

Your Next Plate Heat Exchanger Should Match!...



- **Does it have a high coefficient of heat transfer?**
- **Will it stand high pressures?**
- **Is assembly and disassembly easy and positive?**
- **Is there provision for *precision* tightening?**
- **Are gaskets readily replaceable?**
- **Is it designed for easy cleaning, either by backflushing or hand washing?**
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KEEPING UP WITH THE FIELD

Technical News • Washington Highlights • Economic Trends • Labor Developments

KO's Turkeys With CO_2

Injuries sustained by turkeys due to slaughter-house struggling can be eliminated by putting the birds to sleep with carbon dioxide.

Agricultural Marketing Service of USDA has shown how. Under actual plant conditions, 73 to 77% gas concentrations do the trick. Later examination has revealed no damage to meat from this process.

Knockout time varies with variety, sex, and weight of birds—with the lighter ones being effected first. "Head-up" proved to be the best position for the operation.

Meanwhile, an immobilizing CO_2 tunnel for conveyor-suspended birds has recently been brought out by Barker Poultry Equipment Co., Ottumwa, Iowa (FE April, p. 84).

The original carbon dioxide painless-kill method was developed by Geo. A. Hormel Co. for use on hogs (FE Oct. '52 p. 90). It won the 1953 Food Engineering Award.

Tomato Powder Non-Stop

Production of puffed tomato powder on continuous vacuum pilot-scale is now being carried out by WURB, (Western Utilization Research Branch, USDA) on Chain Belt Co. rotary dryer equipment.

Heretofore, product has been made only in laboratory vac-shelf units, but the processing is now considered to be commercially feasible in the rotary unit presently used for powdered orange production (FE Mar., p. 73).

In contrast to the latter, a significant advantage, say researchers, is that full tomato flavor can be retained throughout the process.

QMC is evaluating the test products for possible use by armed forces.

Ups Carton Orange Juice

To meet big consumer demand, Golden Gift, Inc., Eustis, Fla., producer of fresh citrus juices, has recently doubled output with new plant facilities.

Thus, production is now up to 1,680,000 qt./wk. of orange juice, and also 180,000 qt./wk. of the newly offered grapefruit juice.

Further, a new plant projected at Deland, Fla., for 800,000-qt. production will be redrafted for 1,250,000-qt. performance.

Juices are processed with ultraviolet rays to eliminate enzyme action, then shipped by tank truck to distribution points in 35 states. Here, product is put up in milk-type cartons for delivery to the housewife.

Antioxidant for Cracklings

Quality of meat scrap (cracklings) is safeguarded by adding an antioxidant (Tenox) to the cooker before rendering, according to researchers at Eastman Chemical Products, Kingsport, Tenn.

Thus stabilized, byproduct cracklings reportedly show a 20-fold increase in storage life. This permits delivery, as is, to commercial feed manufacturers.

"Pop" Aids Heart X-Rays

A glass of carbonated beverage given to a heart patient helps produce an accurate X-ray picture of the enlarged organ. CO_2 in the drink dilates the stomach like a balloon, thus thinning the walls and enabling X-rays to pass through more easily and photograph parts of the heart lying behind.

Seek Tighter Regulations For Weighing, Measuring

Greater protection for both merchant and consumer through revision of state regulations for commercial weighing and measuring devices was urged at the National Conference on Weights & Measures.

Specifically, an amendment to the Model State Law on Weights & Measures was discussed by M. Nelson, chief of Michigan's Bureau of Foods & Standards, and chairman of the Conference Committee on Legislation. This amendment would require special labeling on random-size containers, such as those used for prepackaged meat and cheese.

Citing problems of prepackage merchandising, Mr. Nelson said consumers sometimes don't know how a total price is computed. Unit price isn't shown, and wrapping materials may be included in the total weight.

Accordingly, the Legislative Committee called for legal requirement of a statement of net weight and unit price (when total price is indicated).

On the problem of testing farm milk tanks. M. Jensen, National Bureau of Standards, detailed means of increasing precision.

Receives FE Award at Annual IFT Meeting

David D. Peebles (right) is congratulated as he receives 1955 Food Engineering Award on behalf of Western Condensing Co., of which he is chairman. Samuel Cate Prescott (left), chairman of Award Committee, and Frank Lawler, editor of FE, participated in presentation. Western condensing won this award for outstanding achievement in food technology on the merits of its process for producing instantly soluble low-fat dry milk. The winner was named by Dr. Prescott's committee, which was appointed by the president of the Institute of Food Technologists. Presentation took place at the annual meeting of IFT in Columbus on June 13. **(Turn page for Peebles' talk.)**

FE Award Winner Hails Modern Processes Foresees Day of "7-7-7" Dinner

How advances gained today open striking concepts for tomorrow was accented by D. D. Peebles, Western Condensing Co., Petaluma, Calif., in rounding out his IFT talk on development of the Instant Milk process, winner of the 1955 Food Engineering Award.

Terming the new milk as "only a single chapter in our fast-developing modern revolution," he emphasized that "many other foods, such as fruits and vegetable juices, potatoes, and coffee, are undergoing equally dramatic changes—all to the health and financial benefit of the homemaker and her family."

He cited the contribution of new processes to packaging, distribution, and kitchen convenience. "Of more importance," he continued, "is the fact that the processes are helping solve age-old problems of spoilage and retention of flavor and, in many cases, are actually improving on Mother Nature in nutrition.

"Already," he went on, "scores of food items can be purchased at comparatively low cost in dry form, can be safely stored, and can be prepared within minutes as fine-flavored, wholesome foods.

"It is entirely possible that 10 years from now Mrs. Housewife will be able to carry home the family dinner in a small shopping bag and prepare it within 5 min.—at a substantially lower cost.

"In fact, the day of the seven course dinner in seven minutes from seven paper packages may not be far in the future."

Waxed Paper Guards Riboflavin in Bread

Between 70 and 85% of initial riboflavin content is retained in bread that is wrapped in opaque waxed paper and then exposed to conventional light. In contrast, only 45-65% remains in the product put up in cellophane.

This credit for protecting against degradation by light went to the waxed paper following a two-year study by W. Hardy and W. Kanninen of Foster D. Snell, Inc., New York City.

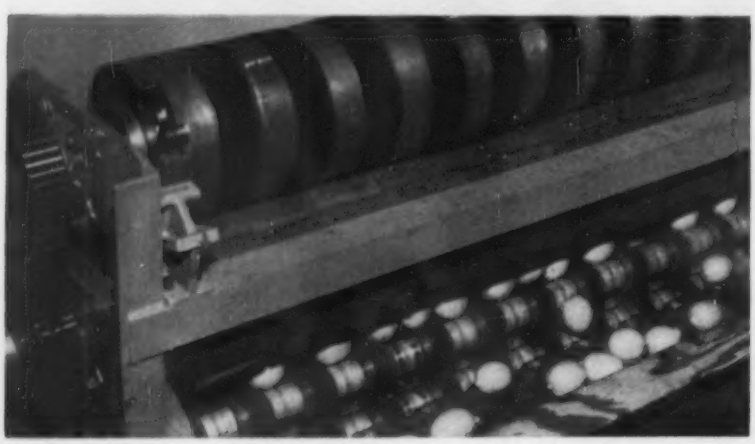
The tests were carried out on 120 loaves of enriched white bread, which was exposed to maximum probable diffuse daylight and/or fluorescent light under normal conditions of commercial distribution.

QM Solves Bug Tactics

Confused flour beetles actually cannot bore through cellophane wrappers, say QMC researchers.

But—the bugs do "flatten themselves in" through folded ends and then lay their eggs. Resulting larvae are strong enough to punch their way through film.

Study was made to pinpoint methods of insect infestation. Shown is the need for tighter wrapping of army rations—as well as closer warehouse santitation control.



No-Bruise Lemon Printing

Problems of printing trade names on lemons—they're elliptical instead of round, and easily bruised—are reported solved with this mass-operation machine now completing tests on the West Coast. Multi-rows of 16 lemons feed in via a roller elevator (behind). Carried through in individual pockets, fruit is "kissed" by ink dies cushioned in a sponge rubber roll. Latter adjust automatically to different-size fruit. Equipment was developed by D. C. Savage and M. Johnson, Jr., of the Sunkist Growers field staff.

Wide Use of Carotene As Food Color Seen

Significant progress is being made in production and use of synthetic beta carotene, a pro-vitamin A imparting yellow color to processed foods.

In pointing up this progress at the recent meeting of the New York Section of IFT, J. C. Bauernfeind, Hoffman-La Roche, Inc., Nutley, N. J., discussed several applications:

Carotene being the natural coloring of butter, addition of the synthetic product is an excellent way of standardizing both the color and vitamin A activity of butter in the future. Practically all large margarine makers are using, or plan to use, carotene. And a carotene-colored shortening is being extensively marketed for home use.

Excellent stability of added carotene in margarine and shortening has been observed. And baked goods prepared with carotene-colored shortening, and margarine, demonstrate good retention of color.

Interest has been shown in coloring confections, fruit products, dried pastes, and dessert powders with this ingredient. And it offers a way to obtain the desired dark color in frozen egg yolks.

Pure beta carotene is a brownish red, violet-tinted, crystalline powder soluble in oil and organic solvents to produce a yellow-orange color. It is the most important of the pro-vitamins A, and is converted to vitamin A by the human and animal organisms.

This year marks the beginning of large-scale commercial production of synthetic crystalline beta carotene.

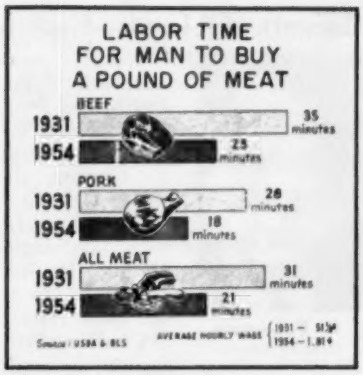
Brewing Chemists Report Sugar, Turbidity Factors

Techniques for measuring fermentable sugars and turbidity in beer were two subjects of talks at the recent Philadelphia meeting of the American Society of Brewing Chemists.

Fermentable-sugar readings by the Standard ASBC procedure was reported to be about .1% lower than those recorded by the Mathers Beck method. Of further interest here were the findings of Held, Garratt, and McFarlane relative to a new paper chromatography technique. A good gage of glucose and maltose is reported.

Beer turbidity may be measured with the formazin "basic stock solution", which was shown to be stable for 4 to 8 weeks. Present main objectives are visual and photometric measuring procedures, using aqueous formazin as a standard.

Other highlight talks concerned determinations of wort color, copper, fluorides, and soluble starch.



Worker Gets More for Less

Today's factory worker can get a bigger cut of meat for his working hour. While consumer prices have risen 77%, from 1931 to 1954—hourly earnings have shot up 251% (without taking into account fringe benefits). The 1955 work-meat spread will be even greater, due to further boosts in wages and some price declines.

Hors d'Oeuvres

▶ **Senior Foods have been experimentally introduced to the grocery market by Heinz. These are geriatric items for the aged under a name with no Grim Reaper connotation.**

▶ Cincinnati was picked for the Senior Foods market test because it has a high percentage of oldsters (9.9% over 65 vs. U.S. average of 8%). Lot of breweries there. Or maybe it is the Kroger Food Foundation that has nurtured the Ohioans to a ripe old age.

▶ **Quality control really will pay off for these second-childhood foods. The more effective they are the longer consumers will be around to buy them.**

▶ Forecasters point to an oldster-food market of 23 million people over 60 by 1960 —27.5 million by '70. Since the majority remain in the old-age group for several years, Senior Foods could make the infant foods boom look like a baby.

▶ **While "Senior Foods" is a good name, "Manna for the Mature" would seem more motivating.**

▶ The Heinz slogan could be "Eat our Senior Foods and go like sixty."

▶ **But would seem that Heinz "57" label is a little young for its geriatric goodies.**

▶ Let us wish Senior Foods every success. For there soon will come a time when you and I will need them.

▶ **A new edible synthetic detergent made from sugar is reported by Sugar Research Foundation. Just the thing to wash sand and pesticides from spinach and other produce. But the threat of washing junior's naughty mouth will lose its punch.**

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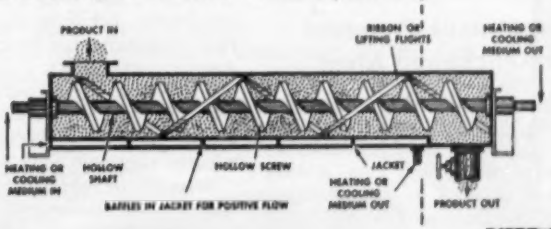

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Pilot Research Malter

Complete automatic control and full gravity flow are featured in new, 1 in.-to-1 ft.-scale pilot malting plant, recently completed at George J. Meyer Malt & Grain Corp., Buffalo. In operation, 28 ft. 8 in. unit will malt large-sized barley samples to get positive quality information before buying grain stocks. Production problems will also be explored. Platform where men are standing elevates to allow easy process inspection through any of 168 glass doors. Model is forerunner of 240-ft. commercial tower.

Ray-Treatment Proposed For Pre-Packaged Meat

Viewed as a coming possibility is a gamma-technique whereby meat wholesalers could speedily irradiate prepackaged fresh meat cuts, ground meat, and chicken in a continuous-conveyor, ray-treatment unit.

Thus processed just before delivery to retailers, the meats would have extended shelf-life—up to three weeks more at refrigerator temperatures—reports Prof. L. E. Brownell of U. of Michigan's Fission Products Laboratory.

Speaking before the recent 1955 Conference on Nuclear Engineering, he cited the present disadvantage of having to sell cut-up meat hurridly to prevent loss by spoilage.

But in the new conception, meats would be carried by conveyor through a radiation chamber, which could use Cesium-137 as a ray source. A rate of 14 tons per hour is estimated, with treatment cost put at .05 to .1c. per pound, depending on dosage required.

"Animal-feeding experiments conducted for about two years have given us no reason to think irradiated foods are not wholesome," Professor Brownell said. "Nor have taste panel tests revealed any preference between untreated meat and that given low dosages of irradiation. However, high dosages have resulted in changes in flavor."

Unknown Malnutrition

Many people suffer malnutrition without knowing it, declares the National Citizens Committee for World Health Organization, Inc.

In central America half the children die by the age of five, says Prof. C. G. King, scientific director of the Nutritional Foundation and member of the Committee. The remainder are in poor health due to a diet which, though providing bulk, is deficient in protein and vitamins. Because they aren't hungry, they don't know they are malnourished.

Here, need for home education in nutrition was accented, since frequently the "damage is done" by the time a child gets school distribution aid. The researchers are evaluating regional diets throughout the world. Where deficiencies exist, they formulate action programs to improve conditions.

USDA Plans German Fair

Cologne, Germany, will be the site of a large USDA-sponsored international food fair, Oct. 1 to 9. And approximately 6,456 sq. ft. in the fair's Hall of Nations has been reserved for American exhibitors.

This is an opportunity for display of U. S. food products abroad, opening possibilities of increased foreign sales by domestic food processors.

Secretary of Agriculture Benson personally invites comments from American food processors relative to the proposed fair—from possible exhibit ideas to needs for participation. Interested parties should write to the International Trade Fair Staff of the Foreign Agricultural Service, USDA, Washington, D. C.

Big Donation-Cheese Order

Six concerns now are working on USDA contracts to supply 61.8 million pounds of process American cheese in 5-lb. loaves for the school lunch program and welfare outlets.

CCC cheddar is employed by the companies, which are Swift, Chicago; Cudahy, Omaha; Hygrade, Shelbyville, Mo.; L. D. Schreiber & Co., Green Bay, Wis.; Central Cheese Co., Marshfield, Wis.; and M. Wildstein & Sons, Philadelphia.

Prices range from 2.52c. lb. (Swift) to 3.25c. lb. (Wildstein). On contract completion in Mar. '56, a total of 134.4 million pounds of this cheese will have been distributed to domestic outlets since July '54, when the Agricultural Trade Development & Assistance Act of '54 took effect. Earlier (May '53 to mid-'54), 37.1 million pounds were moved under other provisions.

Garnatz IFT Leader-Elect

G. F. Garnatz
Heir to mantle donned by Clifcorn

Named president-elect of the Institute of Food Technologists for '56-'57 is George F. Garnatz, director of the Kroger Food Foundation, Cincinnati, Ohio. He has been chairman of the Taste Testing & Consumer Preference Committee of IFT.

Meeting of the group in Columbus meanwhile saw installation of LaVerne E. Clifcorn, associate, Research Div., American Can Co., Barrington, Ill., as president for '55-'56, succeeding Dr. Philip K. Bates of the Carnation Co.

The Institute currently numbers 4,157 members, a net gain of 221 over the last year. Attending the annual gathering were some 1,200 members plus 300 non-members.

Mini-Loaf Halves Test Time

Thanks to micro-baking techniques, the tedious 8 yr. of planting, growing, and replanting new wheat varieties, to get enough new-strain grain for bake-test purposes, have now been shortened to 4 yr. Despite having a total volume of only about half a slice of regular bread, the Lilliputian loaves duplicate full-size product and attendant conditions. The tests proceed at Kansas State College, Manhattan, where the laboratory has supplied a miniature mixer, dough molder, tiny ovens and fermentation chests, and 1-in. bread pans.

Are your motors round pegs in oblong holes?

A motor that isn't *well chosen* for a particular application—like a round peg in an oblong hole—will often "do."

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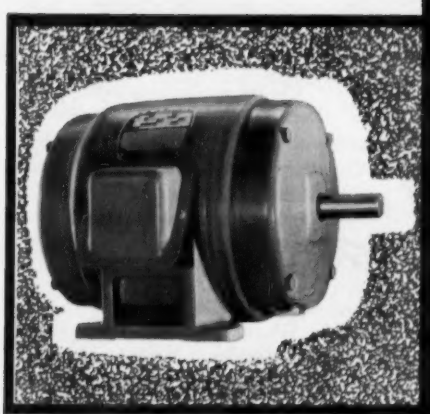
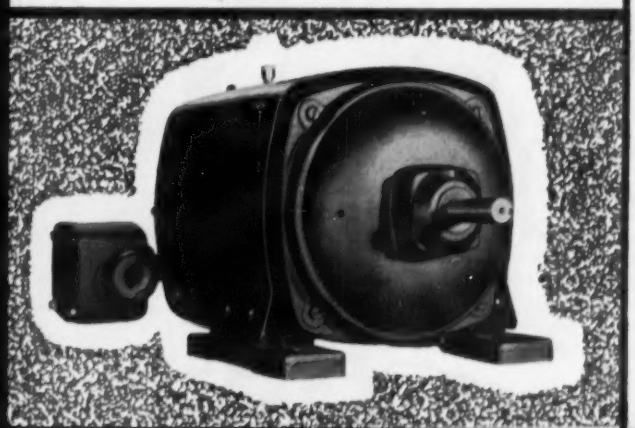


New Leland "Loadstar" to reframed NEMA standards, polyphase, drip-proof, ball bearing; 1, 1½ and 2 hp in 180 Series frame illustrated.



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Cuts Vapor Transfer In Refrigerator Cars

The problem of vapor penetration into reefer-car insulation got attention at the recent Milwaukee meeting of the American Society of Refrigerating Engineers.

Air passage from the outside can be stopped by sealing the body shell and covering the insulation with air-vapor-resistant material, say researchers.

Further, vapor transfer from the cargo space, which occurs during loading and unloading, is cut by a double-wall envelope construction (now in use on Pacific Fruit Express frozen food cars). Cargowall is sealed. Insulation wall is porous. Refrigerated air passes between walls to cool cargo and remove stray moisture from insulation.

Paper was presented by S. W. Eby, Jr., Research & Development Center, and R. L. Collister, assistant manager, Equipment Insulation Dept., Armstrong Cork Co., Lancaster, Pa.

"Frozens" Remain Edible 4,700 Ft. From A-Blast

Frozen foods, too, came through the recent atomic-bomb test in satisfactory condition, according to word from the National Assn. of Frozen Food Packers.

No appreciable change in color or flavor was found when samples of frozen codfish, strawberries, orange juice, peas, French fries, and chicken pot pies were studied following exposure inside a home freezer positioned 4,700 ft. from ground zero.

True, the freezer was dented by the blast, but the foods inside were undamaged—still remained in frozen condition, and bore no radioactivity, hence were taste-tested without hesitation.

Other samples buried just beneath the soil at 1,270 ft. showed only small amounts of radiation, although the metal boxes in which they were packed proved "too 'hot' to handle" for two days after the explosion.

FEMA Elects Officers

U. S. Flavoring Extract Manufacturers' Assn. has named the following board of governors: Pres., D. Jenks, Foote & Jenks Co., Jackson, Mich.; 1st v.-p., M. Hess, S. Twitchell Co., Camden, N. J.; 2nd v.-p., E. Heinz, Jr., Food Materials Corp., Chicago; 3rd v.-p., C. McCormick, Jr., McCormick & Co., Inc., Baltimore; Sec., W. Grant, National NuGrape Co., Atlanta; Treas., L. Smith, Virginia Dare Extract Co., Inc., Brooklyn, N. Y.

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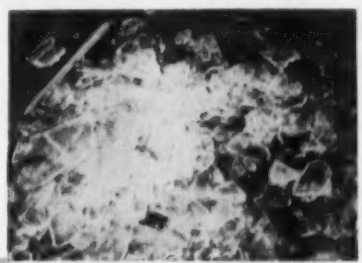
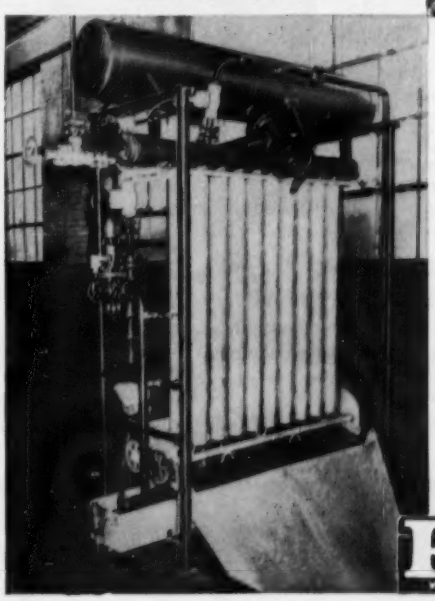
Shell-Ice





Invaluable for dairies, shippers, fishermen, poultry plants, hotels, restaurants, etc. Curved pieces of Shell-Ice, ⅛" to ½" thick, are clear, dry and hard: delivered broken to the size desired, they can be shoveled, conveyed, or blown through a hose. Automatically frozen and harvested by direct refrigeration—no labor, brine, snow, or special cleaning.

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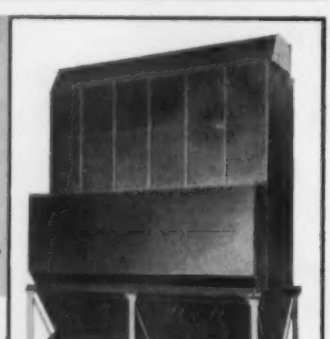

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ABCB Survey Pinpoints Soft-Drink Preferences

Which soft-beverage flavors are liked best by consumers? How are the drinks employed in the home?

These are among the questions clarified by a nationwide survey of 881 families just completed by American Bottlers of Carbonated Beverages.

It was found that kola drinks take preference everywhere (61% south, 38% west, 34% central, and 26% northeast), followed by orange (10%, 16%, 18%, and 13%), and root beer (7%, 22%, 17%, 11%). Ginger ale ranks high only in the northeast (23%).

Lemon and lime combinations are popular with 10% of the people outside of the south, where preference is at a low of 2%.

These specific use-habits were brought out: Across the nation, 29% partake of soft drinks with their meals, 44% use it in punches, and 4% mix it with milk. Some also find a place for the product in meat, dessert, and salad recipes.

Melt-and-Carry Tank Car For Liquid Chocolate

Rail delivery of bulk liquid chocolate and other coatings has been implemented with a special box car. The new carrier (American-Pfaudler Corp.) has a pair of 3,000-gal. stainless steel tanks that permit two different coatings to be shipped at once.

This system has already successfully transported grape juice and brined maraschino cherries. And movement of fresh orange juice is now being considered.

For chocolate, tanks are preheated for loading. And for pumping into plant, at destination, coatings are reheated by 26 radiant-heat aluminum blankets.

The heating controls and pumps are in a central compartment between tanks. Power is supplied via a 220v. plug-in.

Light-and-Shock Fishing

A new electric fishing method, tested by Fish & Wildlife Service, shows possibilities.

Equipment consists of a 1,000w. sealed-beam lamp to lure fish schools, combined with a pulsating, anode-cathode electrical field. Latter directs attracted fish to a funnel, then stuns them, and they're 'hosed' to deck.

Thus far, however, satisfactory performance has appeared limited to calm water, and fish attracted have been small (3-in. range).

Once more the ANY-SPEED Oilgear Drive betters machine performance "painlessly"

Many times in our experience the performance of an already highly efficient machine has been bettered without redesign, solely by changing the drive. One case out of many *varied* cases, is the Tolhurst Centrifugal pictured above, located in a great pharmaceutical house. This centrifugal was originally equipped with a two-speed electric motor drive. However the chemicals it is called upon to handle have widely varying crystal packing characteristics. Some of these crystals packed so densely at the speed available, extraction was inhibited, extraction time far out of balance and crystal removal difficult.

A change was made to an *"ANY-SPEED"* Oilgear Fluid Power Drive. Now the operator is able to shade the speed of the centrifuge experimentally—*and easily discover* the *best* speed for each batch of crystals.

As a result, extracting that used to take from 6 to 9 hours was cut to 4 to 6 hours. The extremely slow speed also available made unloading a great deal easier. This user now has several other Oilgear drives including one on a laboratory centrifuge.

There is very often a direct efficiency coefficient between machine operating speed and the type of work being handled. And we can cite many widely varying instances where equally dramatic and profitable gains resulted at once from a simple change to *"ANY-SPEED"* Oilgear Fluid Power Drives. If you want some interesting factual data on Oilgear's steplessly variable speed drives, their outstanding responsiveness to control impulses, their smooth acceleration and deceleration, talk to an Oilgear Engineering Representative. His mature and sound engineering recommendations may profit you greatly. THE OILGEAR COMPANY, 1580 W. Pierce St., Milwaukee 4, Wisconsin.

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Action on Standards

Following are recent U. S. Grade Standards developments per Agricultural Marketing Service (AMS) and Food & Drug Administration (FDA), with *Federal Register* references:

Raisins, corrections in AMS Grade Standards promulgated in F.R. Apr. 26, p. 2769 and F.R. May 12, p. 3234.

Peas, canned, final promulgation of AMS Grade Standard revision, F.R. May 13, p. 3252, corrections F.R. May 28, p. 3783.

Beets, proposed revised AMS Standards, F.R. May 17, p. 3440.

Turnips and rutabagas, proposed consolidation and revision of AMS Standards. F.R. May 17, p. 3441.

Cheeses, cheese foods, etc., establishment of effective date for revisions of FDA Standards of Identity, F.R. May 20, p. 3529.

Figs, kadota, canned, liquid media, designations and revision in AMS Grade Standards, F.R. May 21, p. 3555.

Farina, enriched, establishment of effective date for revision of Standard of Identity, F.R. June 2, p. 3845.

Pork Carcasses and swine, revision of AMS Grade Standards, F.R. June 4, p. 3891.

Butter, cheese, other dairy products, proposed revision of grading regulations, F.R. June 14, p. 4159.

Eggs, shell, grading and inspection, suspension of effective date for adoption of revised weight classes, F.R. June 15, p. 4176.

Briefly . . .

● MOLD-COUNTING is the subject of two coming short courses—one at Purdue U., July 13-22 (Indiana Canners Assn.); and other at N. Y. State Experiment Station, Geneva, July 27-Aug. 5 (N. Y. State Canners & Freezers Assn.).

● **LOLLYPOP consumption reportedly has been rocketed by introduction of the Salk polio vaccine. Seems that with a comforting lolly in his right mitt a kid meets rigors of the needle with much increased fortitude.**

● IFT's New York Section hails R. C. Sherwood, Sterwin Chemicals, Inc., as its new president for '55-'56. Other new officers are: J. C. Bauernfeind, Hoffman-La Roche, Inc., vice-president; A. Astrack, treasurer; and Ruth Bien, "Good Housekeeping" Bureau, secretary.

● **"CANDYMAKING today is passing through a striking engineering revolution," declared John V. Ziemba, associate editor of "Food Engineering," at the recent Chicago convention of the National Confectioners' Assn. "It is fast developing into an efficient, pace-setting branch of the industry through changing its processes from batch to high-capacity continuous,**

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with lower unit costs," he went on. "But even so, much remains to be done in improving and carefully mechanizing operations."

● A MEAT laboratory has now been set up in Los Angeles (2850 E. 8th St.) by American Meat Institute Foundation through a cooperative arrangement with Gov. W. Gooch Laboratories, Ltd. It will provide direct service to Pacific-area meat and meat byproduct processors in checking product samples.

● **ATOM-ENERGY RESEARCH will be carried on cooperatively by General Mills, Minneapolis-Honeywell, and Northern States Power Co. under the name Minnesota Nuclear Operations Group. GM will accent food applications.**

● CANNED CORN has enjoyed a 6-million-case rise in consumption in the last four years. Credited as one of prime stimulants is Green Giant's "New Fresh Flavor Process" (high-short agitator retort operation) for succulent vac-packed whole kernel corn.

● **BLACK PEPPER, which has been exclusively supplied by the Orient, now bids fair to become a valuable Puerto Rican crop. Successful growth of India-pepper cuttings just outside Mayaquez, P. R., have encouraged Catesby T. Jones, Johns Hopkins, Ph.D., to predict a worthy initial yield by 1958. The McCormick Co., Baltimore, is joint financier of the experiments.**

Schedule of Events

July

21–22—National Kraut Packers Assn., annual meeting; Catawaba Cliffs Beach Club, Port Clinton, Ohio.

29—Northwest Canners Assn., annual summer meeting; Oswego Lake County Club, Oswego, Ore.

August

15–18—International Apple Assn.; Hotel Statler, Detroit.

22–26—National Assn. of Sanitarians, annual educational conference; Sheraton Plaza Hotel, Boston.

28–30—Fancy Food & Confection Show, annual exposition; Hotel Sheraton-Astor, New York City.

29–31—American Soybean Assn. and National Soybean Processors Assn., joint annual meeting; Netherlands Plaza Hotel, Cincinnati.

31–S15—International Congress of Refrigeration; Paris, France.

September

12–16—Instrument Society of America, annual conference & exhibit; Shrine Exposition Hall & Auditorium, Los Angeles.

20–22—Industrial Packaging & Materials Handling Show; Kingsbridge Armory, New York City.

21–23—National Assn. of Dairy Equipment Mfrs., fall meeting; The Northernaire, Three Lakes, Wis.

25–28—Master Brewers of America, annual convention; St. Francis Hotel, San Francisco.

26–30—Atomic Industries Forum, trade fair; Sheraton-Park Hotel, Wash., D. C.

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Electric equipment takes a merciless daily beating in washdown operations at Coast Packing Co., Los Angeles. Before SAFE-T-SEAL was applied throughout plant to fortify insulation, washdowns caused costly breakdowns; prohibitive work stoppages. Today infuses, magnetic coils and switch gear are extremely rare, thanks to SAFE-T-SEAL, *truly the best friend insulation ever had.*

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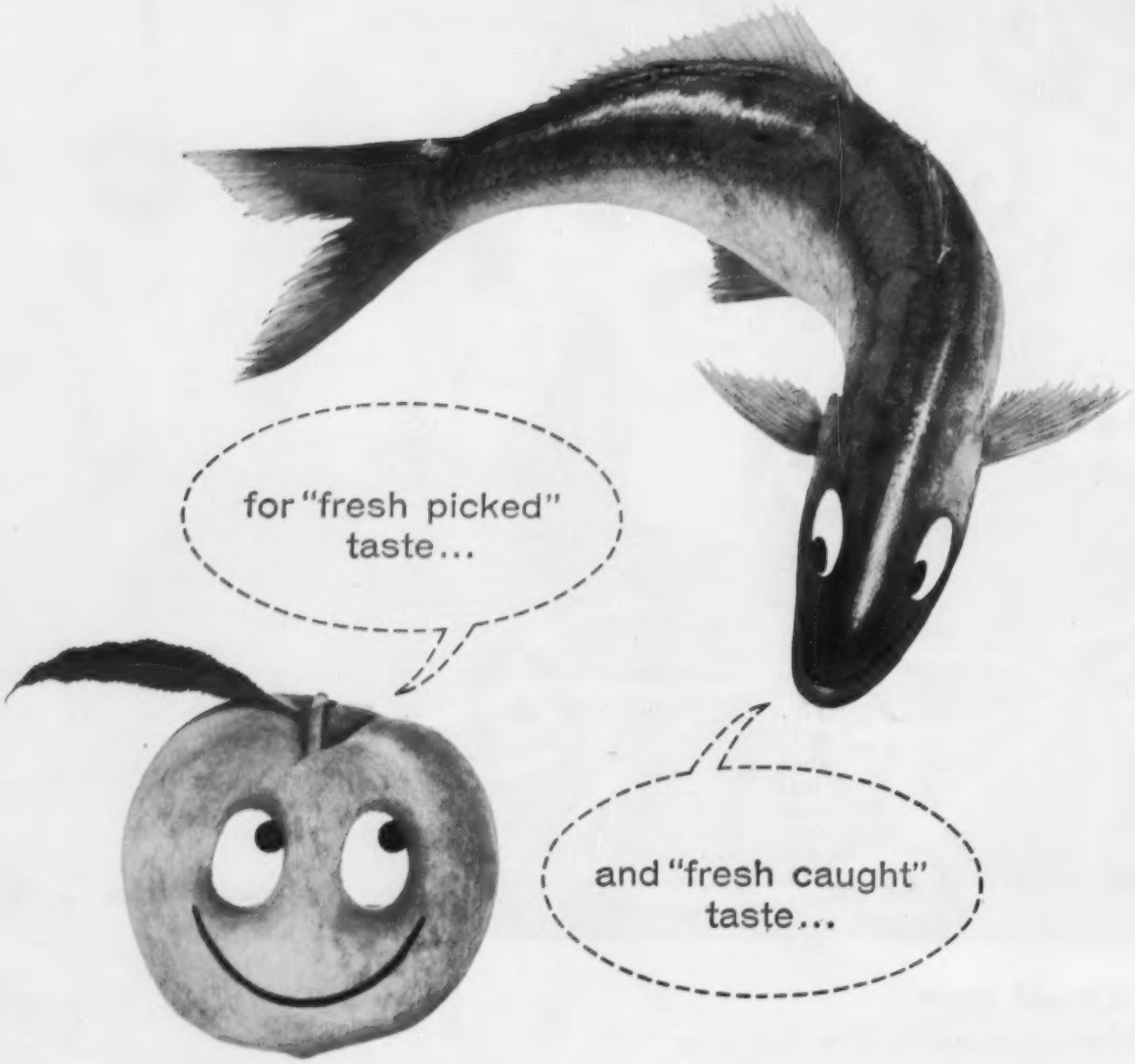

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Charts Aid Sanitation

—Continued from page 51

the task is to be repeated. There is also space for a running inventory of sanitizing materials used.

But probably of most importance to management is the daily report's last column, where the sanitarian may ask for aid in controlling a situation for which he has no responsibility or supervision. These "calls for help" permit management to cooperate effectively in its own sanitation program.

Supplementary Reports

Serving as integral parts of the overall program are two additional check-charts, which also go to management (see Fig. 3).

The Rodent Control Report might suitably be submitted once a month. Information supplied here would particularly note control progress.

The Flour Spot-Sift Test Report is vital in a macaroni-plant santitation program because it covers the checking of each incoming car of flour to determine whether it should be accepted. A car should be refused if the spotcheck shows high insect count.

This evaluation is made by sifting the square-root number of bags through a 30-mesh screen. Should these bags average two or more whole insects (alive or dead) per bag, half that number of bags are rechecked. Then if the same infestation level is noted, the shipment is rejected.

One sheet should be used for each supplier. And it is especially important to keep the last column up to date. In that way, each shipment can be compared with the previous one.

Here, it is pertinent to send copies of the reports to the specific suppliers.

Above article is taken from author's address at the recent Plant Operations Forum of Glenn G. Hoskins Co.

End (Resume reading on page 52)

2 Effects Replace 4

—Continued from page 49

the dairy showed presence of 44 parts of product per million parts of condensate at end of day's operation. This compares with the average of 2,800 ppm. common for conventional double-effect evaporators, and 5,000 ppm. with vacuum pans.

Unit employs a vacuum pump for removal of noncondensible gases. And there is a barometric condenser for vapors. Tower water is used for the latter. Operating pressures are approximately 28-in. Hg in 2nd effect, 24.8-in. Hg in first.

Evaporator comes as a package unit in four sizes (based on ability to condense 8.8% skim milk to 42% solids). Capacities are: 4,400; 8,500; 17,000, and 26,000 lb./hr.

Once started, the unit is self-operating, with automatic controls (1) maintaining levels of product in the various stages, (2) controlling steam pressure entering tube chest of first effect, and (3) adjusting water flow to the barometric condenser. Control of actual concentration, however, is by varying speed of unloading pump.

Operational Data

Based on experience at this dairy, where approximately 16,800 lb. skim milk are condensed hourly, the following shows operating economy:

1. Labor cost—one man operates evaporator and dryer.
2. Hourly steam consumption
   a. Heating 16,800 lb. skim from 90 to 160 F.....1,300 lb.
   b. Condensing to 3,522 lb. (383 gal.) 42% solids...4,290 lb.
   Total.....5,590 lb.
3. Steam cost, based on use of 64 gal. fuel oil at 10c./gal., 70% boiler efficiency $6.40
4. Steam cost per gal. 42% condensed $\left(\frac{\$6.40}{383}\right)$.....$0.01672

Samples of the powder made from this condensed have been compared with those from other low-heat processes as to solubility and flavor. And in both characteristics, the Aldovin product was considered superior.

End (Resume reading on page 50)

Loading With New Speed

—Continued from page 92

going trucks, thus saving floor space.

When necessary, produce is stored in the coolers—but for as short a period as possible. Two coolers are provided, and are maintained at a temperature between 32 and 42 deg. F. One of these units is designed so that it may be converted to a freezer in the future, when frozen foods will be handled.

Consolidated has two banana rooms —one with controlled temperature and humidity for ripening the fruit, the other, for cutting and packing.

No truck repair facilities are maintained, since deliveries are made by a leased 16-truck fleet. The vehicles have panel bodies and 6 in. of insulation. Addition of the cold units will ready these carriers for delivery of frozen foods.

End (Resume reading on page 95)

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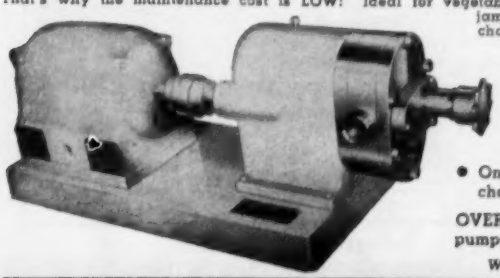

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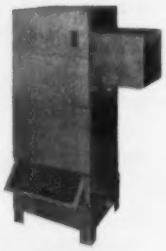

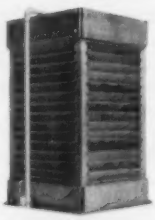

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For every one of the past 30 years, refrigeration and air conditioning experts have specified far more Marley cooling towers than those of any other make. They know that only with Marley towers can they achieve a perfectly balanced job where price, performance and durability mean greatest customer satisfaction.

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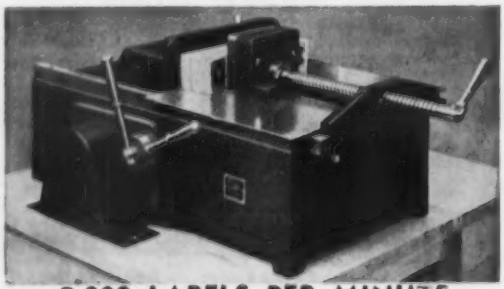

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Jelly-Making Composition Comprising Dry Mixture of Pectin, Tartaric Acid—H. T. Leo and C. C. Taylor, Anaheim, Calif. Nos. 2,703,757-759. March 8, 1955.

Beverage Mix Containing Sucrose, Citric Acid, Potassium Bicarbonate, Aged Flavoring—R. A. Weiss, Miami Beach, Fla. No. 2,704,256. March 15, 1955.

Stable Tortilla Flour by Steeping Corn Kernels in Aqueous Calcium Hydroxide, Comminuting, Dehydrating With Hot Gases—C. S. F. Diez de Sollano and J. M. Berriozabal, Mexico City to Process Millers, Las Vegas, Nev. No. 2,704,257. March 15, 1955.

Salad Dressing by Mixing Dextrine and Powdered Milk With Sugar, Salt, Seasonings, Adding Dry Mix to Vinegar and Water, Beating to Desired Consistency—E. P. Haney, Winchester, Mass. No. 2,704,258. Mar. 15, 1955.

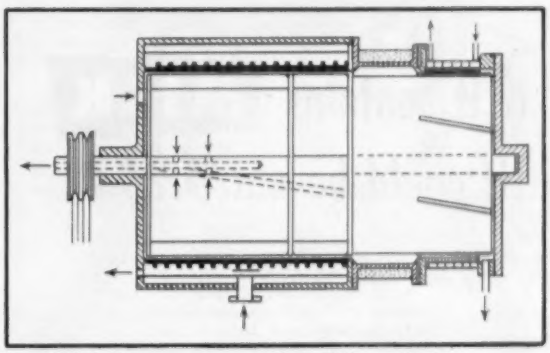
Sausage Links Comprising Uncooked Meat in Polyethylene Casing That Disintegrates at Cooking Temperatures—M. W. Lamb, Montreal, Canada. No. 2,704,259. Mar. 15, 1955.

Alimentary Paste Extruded to Shape, Cooked at 212 F., Dried—R. S. Poole to Kellogg Co., Battle Creek, Mich. No. 2,704,723. Mar. 22, 1955.

Flaked Antioxidant Comprising 3- and 2-Tertiary Butyl-4-Hydroxyanisole Compounds—J. H. Chenicek, Bensenville to Universal Oil Products Co., Chicago. No. 2,704,746. Mar. 22, 1955.

Malt Extract From Cooked Grain Mash by Filtering, Slurrying Solids With Water, Refiltering, Centrifuging Combined Filtrates to Separate Sludge from Effluent Phase—G. J. Strezynski to DeLaval Separator Co., Poughkeepsie, N. Y. No. 2,705,202. Mar 29, 1955.

Potato Product by Expanding Diced Potatoes Into Hollow Shells by Rapid Dehydration in 248-320 F. Air Stream—F. P. Griffiths and P. W. Kilpatrick, Albany, W. O. Harrington, C. E. Hendel and R. L. Olson, Berkeley, Calif. to USA. No. 2,705,679. April 5, 1955.



New High-Temperature Short-Time Unit

Equipment pasteurizes heat-sensitive liquids by flowing thin layer in annular form through heating zone. Material is heated in 2 sec., passes to holding zone, and is then cooled—E. Nanz, Stuttgart, Germany, to Societe pour l'Equipement des Industries Laitieres et Agricoles, Paris, France, and W. J. Sidler, Zollikon, Switzerland. No. 2,708,167. May 10, 1955.

Fats, Oils Stabilized with Organic Antioxidant—N. E. Searle, Crestfield to E. I. du Pont de Nemours & Co., Wilmington, Del. No. 2,706,158. Apr. 12, 1955.

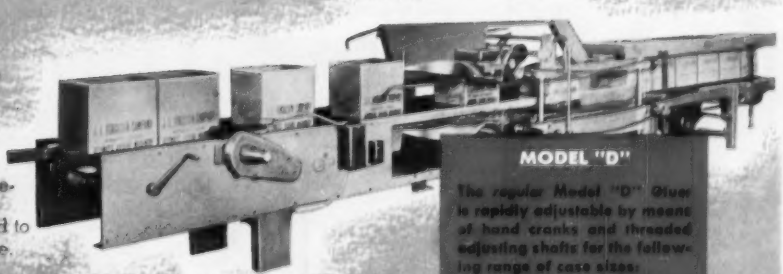
Grain Insecticide Comprising Pyrethrins, Piperonyl Butoxide, Deodorized Hydrocarbon, Volatile Solvent, Vegetable Oil—W. A. Graham to Douglas Chemical & Supply Co., N. Kansas City, Mo. No. 2,706,700. Apr. 19, 1955.

Low-Sodium Milk by Contacting Synthetic Potassium Resin Without Altering pH, Calcium Content—A. L. Chaney, Glendale, and K. D. Johnson,

Packomatic FULLY AUTOMATIC CASE SEALING MACHINE

NO OPERATOR REQUIRED ON PACKOMATIC MODEL "D"

Cases are automatically aligned, flaps opened, glued, closed, sealed in compression unit—then discharged ready for shipment or storage. It is easily changed to other sizes, and is economical to operate. Construction is heavy, mechanism is simple and trouble free. The Model "D" will handle light or heavy corrugated containers or heavy solid fibre.



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HEIGHT	3" TO 18"

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if it contains MILK it could be our *baby*

If your product contains milk solids, or is used with milk, SeaKem "Colloids Out of the Sea"® may be able to *improve body and texture, make more desirable gels, suspend component ingredients more effectively.* The stabilizing advantages of SeaKem Colloids have been clearly demonstrated in a wide variety of such products, including chocolate milk, milk base pie fillings, milk puddings, milk shake mixes, syrups and frostings.

For instance, application in milk puddings and pie fillings goes all the way from the use of a straight SeaKem Irish Moss extractive without eggs to produce a light bodied custard or blanc mange, to combinations with cornstarch, with tapioca starch, or with blends of starches. When used as a starch modifier, benefits are as follows:

1. Pudding or filling is lower in viscosity during cooking. Thus heat transfer is better and scorching over direct heat is minimized.
2. The "set" comes in part from the SeaKem Colloid. Gel forms only on cooling. Boiling temperatures, as required for starch, are not necessary to activate the Irish Moss extractive. Yet if the milk is boiled, there is no injury. Thus the housewife or baker obtains a pudding or pie filling more uniform in texture, even when overcooked or undercooked.
3. Setting time is fast, cutting length of period from preparation to serving.
4. Puddings may be unmolded easily for formal service, or for ease of serving from large batches. Pie servings are made "non-runny."
5. Common and objectionable surface skin is greatly reduced. Marked improvement in this respect is especially noticeable in chocolate flavors.
6. Unsurpassed texture and eating quality is achieved. No tendency towards pastiness and no starchy flavor. End product spoons well.

*SeaKem is the registered trademark for the standardized hydrocolloids obtained from Irish Moss by the Seaplant Chemical Corporation. Extracted and refined by rigidly controlled processes which insure dependable uniformity and purity, SeaKem Colloids are light amber to colorless, free-flowing flaky powders. Available in a variety of types suitable for a wide range of stabilizing functions, SeaKem Irish Moss extractives have won acceptance with leading food manufacturers on the basis of their unique contributions.

For more information about how SeaKem Colloids can contribute to the improvement of products containing milk solids, or which are used with milk, write Dept. FE.

Serving Industry with "Colloids Out of the Sea"

Seaplant CHEMICAL CORPORATION

63 David Street, New Bedford, Mass.

Montrose, Calif., to A. L. Chaney. No. 2,707,152. Apr. 26, 1955.

Sugar-Coated Cereal by Mixing Whole Grain With Sugar Syrup and Fruit Particles, Heating, Adding Granular Sugar, Cooling—C. H. Bettman, Hewlett, N. Y. No. 2,707,153. Apr. 26, 1955.

Antioxidant Comprising Phenolic Compound, Ascorbic Acid, Alkali Metal Ascorbates and Phosphates—B. T. Lehmann, Dayton, Ohio and B. M. Watts, Tallahassee, Fla., to Monsanto Chemical Co., St. Louis. No. 2,707,154. Apr. 26, 1955.

PROCESSES

Refining Fatty Oils by Reacting With Phosphoric Acid Prior to Mixing With Caustic Soda—F. E. Sullivan, Staten Island to DeLaval Separator Co., Poughkeepsie, N. Y. No. 2,702,813. Feb. 22, 1955.

Coating Foodstuffs With Wet Jelling Agent, Alkali Metal Pectinate and Methyl Cellulose Solution, Second Coat of Jelling Agent, Drying—N. S. Ebbell, Chicago. No. 2,703,286. Mar. 1, 1955.

Preparing Pie Dough Continuously by Forming, Depositing Controlled Amounts of Shortening in Moving Flour Bed—W. J. Kaser, Long Beach, Calif., to Colborne Mfg. Co., Chicago. No. 2,703,059. Mar. 1, 1955.

Dehydrating Molasses by Atomizing Into Heated, Dehumidified Air Jet, Cooling, Collecting—G. W. Rappleyea, Southport, N .C. No. 2,703,139. Mar. 1, 1955.

Wax Coating Fruits, Vegetables by Passing Articles Through Foamed Aqueous Emulsion—T. G. Cunning, Ontario, Calif. to S. C. Johnson & Son, Racine, Wis. No 2,703,760. Mar. 8, 1955.

Processing Pimentos by Peeling, Washing, Drying, Breaking, Screening to Remove Seeds, Sorting Out Stems and Placentas, Dehydrating, Freezing, Dicing, Packaging—E. E. Todd, Malibu to Ventura Farms Frozen Foods, Oxnard, Calif. No. 2,703,761. Mar. 8, 1955.

Removing Mucilage from Coffee Beans by Treating With Aqueous Wood Ash Extract, Followed by Aqueous Hydrated Lime Suspension—E. de L. Davies, San Sebastian and M. A. Jones, Guatemala City to USA. No. 2,704,255. Mar. 15, 1955.

Dehydrating Cooked Mashed Potatoes by Adding 0.5-1.0 Part Ethanol, Placing Slurry in Regenerated Cellulose Container, Evaporating Water by Diffusion in Air Stream, Recovering Solids—E. G. Heisler, Plymouth Meeting and A. S. Hunter, Philadelphia to USA. No. 2,704,260. Mar. 15, 1955.

Cooking Meat in Sealed Container Having Spaced Heat-Conducting Members Penetrating Product—W. C. Kruger, Indianapolis. No. 2,705,677. Apr. 5, 1955.

Chilling Meat With Supersaturated Air by Compressing, Cooling, Expanding Recycled Air—W. L. Morrison, Lake Forest to Union Stock Yards & Transit Co., Chicago. No. 2,705,678. Apr. 5, 1955.

Refining, Bleaching Fatty Acid Esters by Neutralizing With Dry Alkali Metal Carbonate, Heating, Agitating, Adding Aqueous Hydrogen Peroxide Solution, Reheating With Agitation, Settling, Recovering—G. Barsky to E. F. Drew & Co., New York. No. 2,702,722. April 5, 1955.

Separating Oleic From Stearic and Palmitic Acids by Solvent Crystallization—C. W. Hoerr to Armour and Co., Chicago. No. 2,705,723. Apr. 5, 1955.

Recovering Oils, Fats, Waxes From Earthy Absorbents by Heating With Aqueous Sodium Hydroxide Plus Detergent, Agitating, Heating to 212 F. With Addition of Extra Sodium Hydroxide, Separating—S. D. Chaloner and D. McNicoll, Chester to H. T. Noble, Cheshire, England. No. 2,706,201. Apr. 12, 1955.

EQUIPMENT

Tomato Corer, Skinner Having Shaft, Blade, Locking Means, Pivoted Lever—B. I. Buck to H. B. Rollins, Baltimore. No. 2,703,124. Mar. 1, 1955.

Fruit Stemmer Comprising Elongated Bed, Oppositely Rotating Rollers, Endless Conveyor With Flat Paddles—R. J. Dodgen, Point Lookout, Mo. No. 2,703,125. Mar. 1, 1955.

Pie-Making Machine Having Horizontal Extrusion Chamber, Pistons, Filling and Casing Ma-

terial Compartments, Pie-Forming Means—R. G. Baker to SpeeDee Corp., Dallas, Tex. No. 2,703,536. Mar. 8, 1955.

Milk Evaporator Comprising Vertical Tubular Heat Exchangers, Liquid-Vapor Handling Apparatus, Controls—J. A. Cross, Westerville, Ohio to Mojonnier Bros., Inc., Chicago. No. 2,703,610. Mar. 8, 1955.

Automatic Can Opener With Lever Arm, Punch, Electro-Magnet Connected to Current Source Through Normally Open Switch—G. W. Ragan, Spokane to C. L. Smith, Harrington, Wash. No. 2,703,926. Mar. 15, 1955.

Egg Feeder Consisting of Parallel, Oppositely Moving Receiving Belts, Rollers, Orienting Discharge Device—H. J. Reck, Elgin, Ill. No. 2,704,146. Mar. 15, 1955.

Fish Dresser With Curved Guide, First, Second Rotary Disk Knives Spaced to Cut Through Belly, Remove Backbone—R. Baader and R. Fahrig to Nordisher Maschinenbau Rudolf Baader, Lubeck, Germany. No. 2,704,377. Mar. 22, 1955.

Fish Filleter Comprising Endless Belt, Swinging Receiving Trough With Horizontal, Side Flaps—K. F. Schlichting to Nordischer Maschinenbau Rudolf Baader, Lubeck, Germany. No. 2,704,378. Mar. 22, 1955.

Poultry Plucker Comprising Open-Ended Casing, Reciprocating Members, Feather Cleaning Means—F. Fisher, Providence, R. I. No. 2,704,857. Mar. 29, 1955.

Pan Cleaner, Greaser With Brushes Mounted on Vertical Hollow Shafts, Drive, Oil Dispenser—W. G. Crawford, Birmingham, Ala. No. 2,704,994. Mar. 29, 1955.

Fowl Tendon Extractor Consisting of Perpendicular Feet-Supporting Elements, Engaging, Power Means—A. W. Stauffer, Terre Hill, Pa. No. 2,705,339. Apr. 5, 1955.

Tendon Puller Having Reciprocating Jaws for Holding Leg Between Hock Joint and Foot, Drive Means—F. Fisher, Providence, R. I. No. 2,705,340. Apr. 5, 1955.

Shrimp Grader With Outer, Inner Drums, Axial Shaft, Spiders, Peripheral Helical Member, Dispensing Chutes—P. A. Bradshaw, Arkansas Pass, Tex. No. 2,705,560. April 5, 1955.

Vacuum Dryer Comprising Concentric Inner, Intermediate, Outer Chambers, Heated-Gas Circulating, Product Recycling Means—D. B. Vincent, Tampa, Fla. to P. E. Edrington, Wash., D. C. No. 2,705,842. Apr. 12, 1955.

Citrus Extractor With Inclined Reamer, Collector Pan Having Pulp Separating Means—C. Harden, Pasadena to Brown Citrus Machinery Corp., Whittier, Calif. No. 2,705,984. Apr. 12, 1955.

Want more information on any of these recent patents— If so, you may obtain detailed printed copies by writing direct to the U. S. Patent Office, Washington, D. C., giving serial numbers of those you want and enclosing 25¢ for each copy.

Rice Grader Comprising Frame, Suspended Box Housing Screens Disposed for Gravity Flow, Oscillating Means, Seed Separating Port, Bottom Discharge Spout—J. O. Dockins, Stuttgart, Ark. No. 2,706,047. Apr. 12, 1955.

Stair-Climbing Hand Truck Having Elongated Frame, Depending Brackets, Rotor Shaft, Rachet, Lock Means—J. M. Marshall, to W. D. McMahan and F. L. Rogers, Long Beach, Calif. No. 2,706,640. Apr. 19, 1955.

Weighing-Type Egg Grader With Frame-Carried Depressible Receptacle, Scale, Discharge Means—J. A. Wollow, Danielson, Conn. No. 2,707,049. Apr. 26, 1955.

Malt Turner Having Front-Mounted Product-Leveling Screw—W. W. Raasch to Galland-Henning Mfg. Co., Milwaukee. No. 2,707,097. Apr. 26, 1955.

Poultry Machine Comprising Gizzard Conveyor, Slitting Means, Elongated Spreader—D. W. Terry and T. J. Melton, Athens, Ga. No. 2,707,303. May 3, 1955.

Remote-Reading Tank Gage Including Vertical Column, Upper, Lower Tank Connections, Spaced Guide Rails, Magnetic Float, Electrical Contacts—A. J. Morschel, Yonkers, to Liquidvision Gauge & Control Corp., Oceanside, N. Y. No. 2,707,395. May 3, 1955.

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into delicious fast selling sticks quickly and safely... directly from freezer with amazing speed and slice uniformity —

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Sanitary, cuts frozen fish sticks, meats and other foods without pre-thawing or shrinkage . . . Preserves flavor and natural juices.

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SMALL INSERT: Hopper feed meat slicer

- Powerful hydraulic operation with overload protection . . . waterproof electrical compartment
- Hopper or magazine type automatic gravity feeding . . . under machine delivery
- Safety devices throughout, plus complete encasement for added precaution
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- No machine crevices or joints to collect bacteria
- Welded steel rod enamel finish body, stainless steel top and feeders
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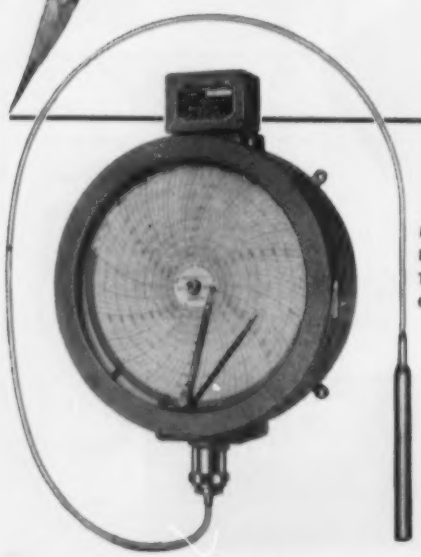

Model RVS Recording Temperature Control

Solenoid-Actuated Nutcracker Having Trough, Fixed Pedestal, Movable Jaws—L. H. Johnson and W. W. Tull, Seminole, Okla. No. 2,707,503. May 3, 1955.

Pie Slicer Consisting of Slidable Carriage, Cutter Assembly, Horizontal Pivot, Vertical Stop—G. Hill to Bettendorf Bakery Equipment Co., Bettendorf, Iowa. No. 2,707,504. May 3, 1955.

PACKAGING

Iced Produce Crate Having Liners, Semi-Rigid Separator Pads, Top Sheet—C. P. Sanbrailo, Watsonville, Calif. No. 2,700,877. Feb. 1, 1955.

Synchronized Printer With Package-Advancing Trough, Pivoted Wheel Biased for Side Printing, Circumferentially Spaced Points, Control Means—J. G. McKay, Chicago. No. 2,701,519. Feb. 8, 1955.

Biscuit Packager Comprising Conveyor, Pockets, Article-Holding Magazines, Transfer Members, Top Plungers, Guide Means—A. Russell to Forgrove Machinery Co., Ltd., Leeds, England. No. 2,701,633. Feb. 8, 1955.

Plastic Bag Former Having Sealing Means, Roll, Guide Flange, Cutter Arm Forming Individual Bags—J. L. Colby, Lockport, N. Y. No. 2,705,443. Apr. 5, 1955.

Potato Chip Packager With Controlled Filling Means, Bag-Shaking, Spreading, Creasing, Sealing Devices—E. B. Wise, Sr., Berwick, Pa. No. 2,705,585. Apr. 5, 1955.

Fruit Container Comprising Molded Plastic Tray, Supporting Member, Wrapper, Ventilating Passages—J. E. Murphy, Hicksville and M. Schnall, Brooklyn, to See-Quail Package Corp., N. Y. C. No. 2,706,038. Apr. 12, 1955.

Heat-Sealer Comprising Conveyor Table With Adjacent Aligned Openings, Flat-Topped Heated, Cooled Plates—D. G. Bolton to E. I. du Pont de Nemours & Co., Wilmington. No. 2,707,018. Apr. 26, 1955.

Egg Carton With Communicating Side, Bottom Walls, Upstanding Inside Walls Having Fold Lines, Inverted V-Shaped, Recessed Portions, Partition Members—O. L. Vines, New York City, to Alford Cartons, Ridgefield Park, N. J. No. 2,707,073. Apr. 26, 1955.

Strahman AUTOMATIC WATER-SAVER SPRAY NOZZLE

Ideal for Dairy and Food Industries

The Strahman Spray Nozzle does a better job with the least amount of water. This precision made nozzle enables the operator to get any type stream of water to do his job by simply pressing the lever. A soft spray is sent forth with slight pressure on the lever, and a strong straight stream may be had by pushing the lever all the way down. This convenient control of the wash water assures better cleaning with a lot less effort. The nozzle automatically shuts off the moment the lever is released, thereby eliminating all waste of water.

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Award Plan That Pays Big

—Continued from page 69

during 1953 was accorded at the company's Service Award-Bonus Party held in Apr. 1954.

Values Gained

It may be too soon to determine all the results of this program. However, it is certain that thus far the campaign has borne these fruits:

- **Company relations with the communities have been bolstered.**
- **Employee morale has reached new peaks.**
- **Communications at first management level have been strengthened, and**
- **Training for management has been speeded.**

Here's how the program was started, promoted, and consummated:

Following the initial announcement, each worker received a questionnaire on which to list his civic and organizational activities during the year. Included in contributions to community advanced were—

1. *Fraternal & Civic Service*, including participation in such organizations as the Elks, Rotary, Kiwanis, Chamber of Commerce, etc.
2. *Youth Activities*, including Boy Scouts, Camp Fire Girls, 4-H Club, and the like.
3. *Educational Activities*, as PTA, school board, planning committees, etc.
4. *Religious Activities*, such as work on church boards, Sunday School superintending, etc.
5. *Government Activities*, including work on governing bodies within city, township, county, or state units, either elective or appointive.
6. *Social & Welfare Activities*, such as participation in state or national drives of the Red Cross, blood bank, community chest, etc., including local welfare work.
7. *Other Services*, covering work with the fire department, Ground Observers Corps, and similar groups not otherwise classified.

Scope of participation included holding officer posts in any group, elected or appointed, or acting as committee chairman, or committee member. Active work in special projects of organizations also qualified a man, and likewise service as a group leader, teacher, or advisor.

Cements Worker-Foreman Relations

To gain maximum morale-building benefits from the campaign, distribution of the questionnaires was carried out by the employees' immediate supervisors. This was made a part of the "January Employee Counseling Plan"—a special yearly occasion giving opportunity for individual talks between supervisors and employees.

It was believed that the questionnaire would give the supervisor a chance to learn much about the life of the worker away from the job—information that not only would disclose unknown characteristics and personality traits but further bring about a closer relationship between employee and supervisor. Hence, the supervisor was charged with the actual placing of the material on the form.

Also this procedure sidestepped individual reticence, and thus placed on record the full extent to which employees were contributing to community activities and welfare.

Filled-out forms in each division were sent to the company's public relations department. Accompanying the form was a letter in which the plant manager designated

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1. Wide pH Range
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the top five persons he considered most eligible for the award. On the plant level, judges included plant manager and two members of the community outside the company —such able-to-judge individuals as clergymen, newspapermen, chief of police, etc.

GHQ Decides

Evaluation of all employee civic activities and services to the community was made at Green Giant's general office. Selected from each plant in each of the three divisions was one individual to be entered in the competition for the division award. Then the division manager, division superintendent, and division personnel manager winnowed the choices down to two from each division for the division award. From these six finalists was selected the 1953 company-wide winner—Claude C. Barnard, Martinsburg, Pa., field superintendent.

The Company Community

Plants are located in small towns with populations ranging from 300 up to 15,000. And it's unquestionable that, in the communities where Green Giant operates, employee attitude contributes greatly to the formation of public opinion and community attitude toward the local plant and entire company.

This item from the Morrisons Cove, Pa., *Herald* reflects one local viewpoint:

"Of all the thousands of employees of the Green Giant Co., Claude C. Barnard of Martinsburg was selected for the company's first 'Man of the Year' award, in recognition of his civic contributions.

"Mr. Barnard is a relative 'new-comer'. But in the 16 years he has lived here, his willingness to work for his fellow men, his leadership in civic, religious, and youth work has been an inspiration for others.

"Morrisions Cove is proud of Claude Barnard—and of his company.

"We are pleased that a company as big and widely spread as Green Giant recognizes the importance of its employees' role as private citizens. To us in Morrisons Cove, Claude Barnard, M. V. Bankert, another civic leader, and the other cannery personnel are the Green Giant Co.

"These men are recognized as good neighbors and good citizens, and so is their company."

The corporate attitude which stimulates employees to active participation in civic affairs aids in training the individual to work with, and get along with, people—all his fellowmen inside and outside the plant.

This definitely helps in preparing him to assume plant responsibilities and also to make decisions readily—excellent training for higher management positions.

Assist to Foremen

As stated, when a supervisor, even by cajoling when necessary, obtains all the information required on the community-activity questionnaire, he will have learned much about the employees background, home life, interests and accomplishments. Then this first line of management has come a long way in learning what makes each individual "tick", and therefore how to best fit each one into the scheme for most satisfactory plant operation.

At the same time, when a worker is encouraged to talk about *his* activities—*his* accomplishments—with his boss, the least that can happen is a "shearing of the boss's horns." In most cases, a strong link in the chain of communications has been forged.

End (Resume reading on page 70)

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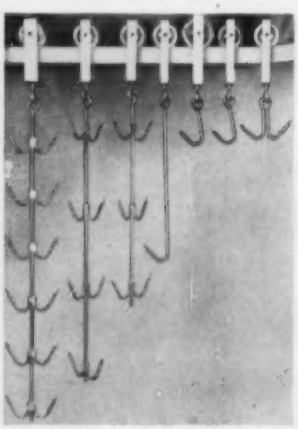

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2408-S	Cut Meat Tree with Ball Bearing Wheel	10 Lbs.	51"	12.80
	Alt Meat Tree with Plain Bearing Wheel	9 Lbs.	51"	11.65
2407-S	Cut Meat Tree with Ball Bearing Wheel	9 Lbs.	39½"	11.25
	Alt Meat Tree	8 Lbs.	39½"	10.00
2404-S	Fore Quarter Beef Plain Bearing Wheel	6 Lbs.	32"	3.85
2406-S	Side Beef Plain Bearing Wheel	7 Lbs.	15½"	3.50
2405-S	Hind Quarter Beef Plain Bearing Wheel	5 Lbs.	14¾"	3.00
2402-S	Double Sheep Plain Bearing Wheel	5 Lbs.	14"	3.50

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PHILADELPHIA TRAMRAIL COMPANY | **3420 N. WEIKEL STREET PHILADELPHIA 34, PA.**

Men & Companies

Industry

American Molasses Co. has acquired land, buildings, and piers at Beard's Erie Basin, Brooklyn.

Carling Brewing Co. is building new breweries in Mass. and St. Louis with a third under consideration for Atlanta, Ga.

Clinton Foods, Inc. has moved into a new combination laboratory and office building in Greenville, S. C.

Daniels Seafood Co., Fort Myers, Fla., has been purchased by **John Stuart Sales Ltd.,** Toronto.

Dixie Preserves, Ltd., will construct a $300,000 plant in Bell Gardens, Calif. scheduled for completion in Sept.

Don-De Corp. has purchased **Weil & Co.,** a coffee roasting and packing firm in Cleveland.

Everpure Dairy of Danville, Ill. has been bought by **Borden Co.** and Harry Anderson made manager.

Fairmont Foods Co. has acquired assets and business of **Broadview Dairy, Inc.,** Topeka, Kan.

Hill Bros. has changed its corporate name to **Dromedary Co., Div. of National Biscuit Co.**

Holly Sugar Corp. has opened new western div. offices in San Mateo, Calif.

Jan-U Wine's new plant has been approved by the Dept. of Agriculture for continuous service inspection, beef and poultry inspection.

Market Confections, Inc. has bought **Walter A. Hewitt Co.** of Los Angeles.

Pepsi-Cola Co. has opened a new bottling plant in Memphis, Tenn.

Pet-Ritz Foods, Beulah, Mich. has announced purchase of **Crystal Canning Co.,** Frankfort, Mich.

Quaker Oats Co., Chicago, has acquired net assets of **Flako Products Corp.,** of New Brunswick, N. J., through and exchange of stock.

Eugene Johnston Fretz, former vice-president, has been elected president of Robert A. Johnston Co., manufacturers of cookies, crackers, candy and chocolate.

Randy's Frozen Meats of McCook, Neb. has signed contracts with **Boone Industrial Devel. Corp.** to open its first Iowa plant.

Red Star Yeast and Products Co., Milwaukee, has purchased and taken over operations of **Consumer's Yeast Co.,** also of Milwaukee.

Swift & Co. has acquired principal manufacturing and distributing assets of: **Holiday Food Co.,** Van Buren, Ark., and **StoAway Sales Co.** and **ArkMo Transportation Co.,** both of Kansas City, Mo.

Superior Honey Co. and **Bee Industries, Ltd.** have begun construction of a new 50,000 sq. ft. honey-processing and packaging plant in South Gate, Calif.

Tasty Baking Co. has begun a four-story addition to its plant and offices in Phila.

Taylor Wine Co. has completed installation of new bottling equipment designed to double production.

Trade Winds Co. has opened a new plant at Brownsville, Tex.

Personnel

George Anderegg has been named treasurer of Hunt Foods, Inc. of Fullerton, Calif.

Zenas Block has been elected chairman of American Assn. of Cereal Chemists for 1955-56 term.

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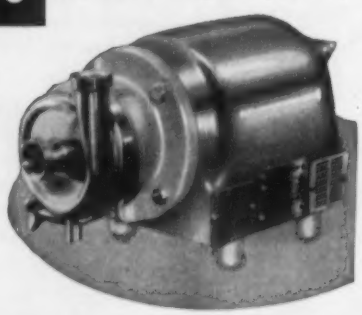

The new Flex-Flo pumps offer new standards for sanitary design, easy and complete disassembly for thorough cleaning—plus ability to be mounted almost anywhere for most efficient use. Sanitary rotary seal—no stuffing boxes. Approved by Sanitarians for use throughout the food industry for pumping milk, ice cream mix, beverages, flavors, fruit juices and other liquid foods. Meets 3A Sanitary Standards. Available in six sizes and types. Prompt shipment.

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J. L. Slais has been promoted to position of Chicago District Sales Manager of Ungerer & Co., Inc., essential oils and flavors house.

Alan Cummings has been elected vice-president of Consolidated Food Processors, Inc.

William P. Drake is new president of Penna. Salt Manufacturing Co., Phila.

T. R. Edgerton has been appointed manager of Special Yeast Products Div. of Red Star Yeast & Products Co.

H. Peale Haldt, Jr. has been appointed food products manager for Huron Milling Co., N.Y.C.

John Hazelton has been named executive vice-president of Beatrice Foods Chicago.

Harry Hodge has been elected controller of Pillsbury Mills, Inc., Minneapolis.

Dr. Robert Holland has been named new head of the dairy industry department at Cornell Univ.

Royal Jumper, former president of Kendall Foods, Inc., a subsidiary, was named vice-president of Standard Brands, Inc.

Chester Martin has been made executive vice-president and general manager of Pepsi-Cola Bottling Co., Washington, D. C.

C. Frederick Mueller and **William Bristol III** have been elected to the board of directors of Burry Biscuit Co.

John O'Connell, former chairman of N. Y. State Liquor Authority, has been named president of Paul Masson, Inc., Saratoga, Calif.

Annette Robins has been appointed director of home economics in Ocean Spray's cranberry kitchen.

Ralph Schomp has been upped to president of Bluehill Foods, Inc., Denver, Colo., with **A. J. Lawter,** former president, taking over as chairman of the board.

Roy Walters has been named v.-p. in charge of research and development for General Foods. Other new vice-president appointments include, **Robert Bennett,** general manager of Associated Products Div.; **Herbert Cleaves,** general manager, Sales Div.; **Edwin Ebel,** marketing director; **F. J. Otterbein,** general manager, Birds Eye Div.; **Wesby Parker,** general manager, Post Cereals Div.

Carl F. Wente and **Walter Buck** have been elected directors of Foremost Dairies, Inc.

Paul H. Willis was named vice-president of Carnation Co.

Associated Industries

Allen - Sherman - Hoff Co., Wynnewood, Pa. has elected B. C. Berry board chairman and H. E. Allen president.

American Box Co., Cleveland, and its subsidiary **American Wood Products Corp.,** have named A. R. Caputo and Glenn Maxfield to their board of directors.

Archer Daniels Midland Co. has opened its new chemical plant in Ashtabula, Ohio.

Dr. Ernest Lockhart, nutritional authority and former physiologist for an Antarctic expedition sponsored by the U. S. Dept. of the Interior, has been appointed Scientific Director of the Coffee Brewing Institute, Inc. and will assume direction of all research activities in Sept.

Arthur Colton Co. has announced a $500,000 plant expansion program.

Borg & Beck Div. of Borg-Warner Corp. has announced election of Harold Nutt as president.

Bostitch, Inc. will move main manufacturing plant and general offices to East Greenwich, R. I. where a new factory will be built.

Brockway Glass Co. has broken ground for a new glass container plant in Freehold, N. J.

Continental Can Co. has appointed Chester W. MacArthur manager of its Washington, D. C., office.

Durez Plastics & Chemicals, Inc. has been consolidated into **Hooker Electrochemical Co.**

Fischer & Porter Co. has promoted Robert Stern, Louis Aricson, Nathaniel Brewer, and Edward Querner to v.-p. posts.

Flexible Package Co., Chicago, subsidiary of **Bemis Bros. Bag Co.**, has named A. D. Hoeppner manager.

Frank W. Bireley Co. has moved to new quarters in No. Hollywood, Calif.

Fruehauf Trailer has appointed John Bohmrich assistant to the vice-president.

Robert Gair Co., Inc. has opened a new container plant in Atlanta, Ga.

Glass Container Mfrs. Institute, Inc. has elected Joseph Nester new president.

Industrial Packaging Co., Inc. will open a new expanded operation in Ridgefield Park, N. J.

Merchants Refrigerating Co.'s warehouse at Hopkins, Minn. is now in operation.

National Aniline Div., Allied Chemical & Dye Corp. has completed its new research and engineering center at Buffalo, N. Y.

Permacel Tape Corp. has named George Fitzgerald vice-president.

Roth Laboratory for Physical Research has been formed by Wilfred Roth to succeed the Rich-Roth Lab.

Thomas Goodloe, vice-president and director of Equitable Securities Corp., Nashville, has been elected to Morton Packing Co.'s board of directors.

Raymond Corp. of Greene, N. Y. has elected George Raymond, Jr. president to succeed his father, George Raymond, Sr.

Raymond Bag Co., Middletown, Ohio, has elected W. F. Lawrence, former president, chairman of the board and upped Clarence Mers to president.

Reynolds Metals Co. has elected Joseph H. McConnell a director and general counsel.

Riegel Paper Corp. has opened a branch office in Atlanta, Ga.

U. S. Cold Storage Corp. has elected E. M. Dodds chairman of the board and chief executive officer and E. E. Hesse president.

Utility Plastic Bag Co., Chicago, has named Lew Goodman president, Alfred Doi, executive v.-p., and Lloyd Lundeen, v.-p.

Wabash Fibre Box Co., Terre Haute, Ind., will construct a new corrugated box plant in southwest Chicago.

Western Condensing Co. has elected Kenneth Ward president and a member of the board.

Deaths

William F. Gravins, Sr., 66, president of William F. Gravins & Co.—June 2.

Alice Brown Kline, home economist and former food editor—June 12.

George A. Sloan, 61, prominent industrialist and president of Nutrition Foundation —June 20.

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New Catalogs and Bulletins from manufacturers of equipment and supplies —Free For The Asking—

PLANT ENGINEERING

Steam Ejectors

High performance details on line of steam ejectors, with suction openings ranging from 1-66 in. Bulletin 9013-A.—*Ingersoll-Rand, New York City.* (202A)

Stainless Steel

Facts and helpful tips on the use of stainless steel fabrications in food plants.—*Allegheny-Ludlum Steel Corp., Pittsburgh.* (202B)

Filter Aid

Use of diatomaceous silica product to up filter efficiency and give a clearer solution detailed for a variety of products.—*Johns-Manville, New York City.* (202C)

Spiral Conveyors

Information on renewal parts for completely engineered spiral conveyor systems. Catalog 851.—*Jeffrey Mfg. Co., Columbus, Ohio.* (202D)

Solids Separation

Diatomaceous filteraid, designed to increase product clarity, discussed in literature.—*Great Lakes Carbon Corp., Los Angeles.* (202E)

Electronic Detector

Illustrated brochure shows operation of a trouble-shooting test panel for complex electronic control systems.—*W. F. & John Barnes Co., Rockford, Ill.* (202F)

Stainless & Titanium Pipe

Two brochures cover uses of stainless steel and titanium pipe and tubing. Physical and chemical properties described. — *Carpenter Steel Co., Union, N. J.* (202G)

Combination Heater-Cooler

Informs on compact unit containing both heating and cooling units for plant temperature control.—*King Co., Owatonna, Minn.* (202H)

Stainless Filters

Deals with a range of filters with stainless steel elements for clean filtration of gases or liquids. Bulletin 213, 4p.—*Micro Metallic Corp., Glen Cove, N. Y.* (202I)

Freeze Systems

Discussion of freezing systems for bulk freezing jobs.—*King Co., N. Cedar St., Owatonna, Minn.* (202J)

Stainless Steel Facts

Information on fabrication and use of stainless steel in processing equipment.—*Crucible Steel Co. of America, Pittsburgh.* (202K)

Cooling Pipe System

Enlarged piping layout, with additional information on refrigerant condenser, cooling tower and water storage tank. Layout 75.—*Jenkins Brothers, New York City.* (202L)

Compact Rotary Blower

Applications and specifications detailed in brochure about a compact, rotary, positive-displacement blower.—*Dexter Folder Co., Michle-Dexter Div., Racine, Wis.* (202M)

Close-Coupled Motor Pumps

Engineering and performance data on ¼ to 75 hp., close-coupled motor pumps. Catalog 7093-E. — *Ingersoll-Rand, New York City.* (202N)

Variable Speed Pulleys

Details given for series of variable speed motor pulleys, designed for ½ to 15 hp. motors. Stop or go greasing possible with the one point lubrication. Bulletin FE8bG.—*Reeves Pulley Co., Columbus, Ind.* (202O)

2-Stage Centrifugal Pumps

Bulletin gives performance features, and facts on interchange of parts, for a series of 2-stage centrifugal pumps with capacities to 1200 gpm., heads to 1,000 ft. Bulletin 722.6 — *Gould Pumps Inc., Seneca Falls, N. Y.* (202P)

Globe, Gate, Check Valves

Information given on line of globe, check and gate valves in stainless steel or alloy. Gate valve features split wedge with free-rotating discs to minimize galling. Circular AD-2080.—*Crane Co., Chicago.* (202Q)

High-Pressure Valves

Contains facts on line of high-pressure, high-temperature valves —pressure sealed to prevent bonnet-leak. Circular 116.—*Walworth Valve Co., New York City.* (202R)

Deaerator Unit

Advantages detailed for new deaerator, featuring stainless steel internal parts and two-stage deaerating action. Bulletin 102, 4 p. —*L. A. Water Softener Co., Glendale, Calif.* (202S)

Unit Coolers

Dimensions and specifications listed for line of compact unit coolers. Equipment available to 3 tons for temperature control above 34 deg. F. Bulletin C-5.41, 2 p. —*Drayer-Hanson, Inc., Los Angeles.* (202T)

Micro Switches

Catalog describes and specifies wide line of small limit, foot, and pendant switches, with illustrations. Catalog 101, 20p.—*Minneapolis-Honeywell Regulator Co., Micro Switch Div., Freeport, Ill.* (202U)

Glass Brick Uses

Tells how to modernize windows with glass brick. Details and specifications given. Booklet GB 104, 8p.—*Pittsburgh Corning Corp., Pittsburgh.* (202V)

AC Motor Lines

Point-by-point check of general, protected, and enclosed ac motor lines. Covers bearings, lubrication, mountings, and other construction features. 12p.—*Reliance Electric & Engineering Co., Cleveland.* (202W)

Boiler Water Gages

Specifies line of high pressure boiler water gages. Overlapping glasses eliminate blind spots between sections. Data Unit 245A, 2p.—*Jerguson Gage & Valve Co., Somerville, Mass.* (202X)

Compressed Air Systems

Handbook relates tips for increased compressed air efficiency. Lists compressor and air system accessories. Bulletin 520A, 8p.—*Sarco Co., Inc., New York City.* (202Y)

Insulation Handbook

Comprehensive 85% *Magnesia Insulation Manual* gives application and theory of magnesia insulating. Many tables provide engineering information. Profusely illustrated. 74p.—*Magnesia Insulation Mfg. Assoc., Washington, D. C.* (202Z)

Blower Units

Data book guides selection of proper-sized industrial blower units. Bulletin UVS 103, 20p.—*General Blower Co., Morton Grove, Ill.* 202AA)

Pressure Filters

Leaflet illustrates pressure filter system usable with wide variety of filter media. Available in portable and stationary models. Bulletin HH 104, 2p.—*U. S. Hoffman Machinery Corp., New York City.* (202AB)

Floor Coverings

Manual gives comparison of various floor covering features, and recommendations for best types in different locations. Folio 551, 18p. —*Hercules Flooring Co., New York City.* (202AC)

Dust Collector

Brochure discusses advantages of a rotary-drum, dust collector that discharges by reverse air jet and screw conveyor. Bulletin 302, 6p. —*Turner & Haws Engineering Co., Boston.* (202AD)

Small Compressor

Explains application of large-compressor channel valves on smaller units to increase operating efficiency. Form 1540, 4p.—*Ingersol-Rand Co., New York City.* (202AE)

Product Hose

Wire-wound, 4-ply hose details, for hot or cold liquid product transfer. It is particularly useful in wine, beer, and fruit juice industries. Bulletin 3540, 2p.—*B. F. Goodrich Co., Akron.* (202AF)

Plate Heat Exchangers

Applications and specifications given for line of stainless steel heat exchangers ranging in capacity from 200-800 gpm. Bulletin E-916, 4p.—*Creamery Package Mfg. Co., Chicago.* (202AG)

Close-Coupled Pump

Diagrams illustrate features of a close-coupled centrifugal pump, with capacities to 2500 gpm. Motor and pump have common shaft. Units are held together by supporting adapter. 6p.—*Allis-Chalmers Co., Milwaukee.* (202-AH)

Variable Speed Drive

Specifications and price list for unique and compact new variable speed drive, contained in two bulletins. Unit features infinite speed control and reversing, by use of tapered rollers. Bulletin 519 and 900, 8p.—*Graham Transmissions, Inc., Menomonee Falls, Wis.* (202AI)

Gas Injector Burners

Capacities and dimensions given for high pressure gas burner series, operating at pressures to 25 lb. Bulletin H-63T, 2p.—*Eclipse Fuel Engineering Co., Rockford, Ill.* (202AJ)

Bronze Valve

Illustrated information on durable bronze valve with new-type alloy seat and disk. 4p.—*Lunkenheimer Co., Cincinnati.* (202AK)

Plastic Piping

Data given for use of flexible, semi-rigid, and rigid polyethylene pipe. Fittings such as elbows, tees and couplings also discussed. 16p. —*Triangle Conduit & Cable Co., Inc., New Brunswick, N. J.* (202AL)

Thermocouple Assemblies

Specifications told for line of bare-wire thermocouples, glands, and special accessories, such as quick-disconnect gland couplings. Catalog 1542, 20p.—*Conax Corp., Buffalo, N. Y.* (202AM)

Water-Treating Systems

Catalog of controlled volume pumps, with diagrams of typical water treating systems for boiler feed and sanitation. Bulletin 953, 22p.—*Milton Roy Co., Philadelphia. (203A)*

Vacuum Refrigeration

Diagrams and pictures tell story of steam-jet vacuum system for obtaining refrigerating temperatures above 35 deg. F. Said to be good for pre-cooling produce or meats. Bulletin 1412.—*C. H. Wheeler Mfg. Co., Philadelphia. (203B)*

Needle Valves

Treats of forged and bar-stock needle valves in "V" point and blunt point models. Toggle valves also covered. Units made in Monel, stainless steel, brass, and aluminum metals. 8p.—*Hoke, Inc., Englewood, N. J. (203C)*

Cooling Control

Explains operation of cooling control valve that opens and closes by expansion and contraction of valve body fluid. Used on compressors, condensers, oil coolers, and similar units. Bulletin 700-A, 2p.—*Sarco Co., Inc., New York City. (203D)*

Stainless Steel Valves

Technical data on types of stainless steel valves with chain wheel, bevel-gear hand wheel, and spring-and-lever-type action. Catalog 55, 11p.—*Cooper Alloy Corp., Hillside, N. J. (203E)*

Air Freshener

Installation pictures and technical facts on use of ozone generators said to banish odors. 16p. —*Melco Sales, Inc., Minneapolis. (203F)*

Chemical Pump

Tells of pump for severe corrosive or abrasive chemical transfer. Features external bearings and positive displacement. Said to have no gaskets, shaft seals, or stuffing boxes. 2p.—*Vanton Pump & Equipment Corp., Hillside, N. J. (203G)*

Thermal-Liquid Processing

Flow diagrams, pictures, and text detail operation of thermal-liquid boilers for processing temperatures to 750 deg. F. 12p.—*International Boiler Works Co., East Stroudsburg, Pa. (203H)*

Plumbing Valves

List of 55 different types of brass plumbing and heating valves with specifications. Sizes range from ¼ to 4 in. Catalog B255, 5p.—*Milwaukee Valve Co., Milwaukee. (203I)*

Motor Line

Condensed catalog lists specifications and prices for popular sized fractional and integral horsepower motors. Catalog GEC-1026, 28p.—*General Electric Co., Schenectady, N. Y. (203J)*

Boiler Auxiliary Units

Four bulletins give facts on operation of steam jet pneumatic ash-handling systems—manual and remote ash hopper valves—hydro-ejectors for eliminating clinkers, iron pyrites, and ash—and bottom ash hoppers and ash gates. Bulletins ASH-5467, 5468, 5539, and 5540, 16p.—*Allen-Sherman-Hoff Co., Wynnewood, Pa. (203K)*

Steam Traps

Covers advantages of a new, compact steam trap featuring one moving part. Seat and disc are made of stainless steel. Bulletin 255A, 4p.—*Sarco Co., Inc., New York City. (203L)*

Portable Heater

Heating, thawing, defrosting, and drying done with portable, oil-fired heater. Unit has blower fan and puts out 168,000 Btu's per hr. 2p.—*Silent Glow Oil Burner Corp., Hartford, Conn. (203M)*

In-Plant Telephones

Brochure illustrates use of an in-plant telephone system to speed communications between departments. Problems discussed, equipment listed. Report 105, 4p.—*Automatic Electric Sales Corp., Chicago. (203N)*

MAINTENANCE

Line of Air Tools

Specifications concerning pneumatic equipment with bolt running and drilling accessories. Form 5200-A, 52 p.—*Ingersoll-Rand Co., New York City. (203O)*

Lubricating Oil

Information on properties of lubricating and hydraulic oils containing added anti-oxidants, wetting agents, and detergents for greater efficiency.—*Standard Oil Co., Chicago. (203P)*

Damp-Wall Paint

A deodorized enamel is said to apply easily on damp walls over condensation. Contains an additive to retard mildew and mold formation. Folder 451—*Garland Co., Cleveland. (203Q)*

Floor Maintenance

Machine speeds wood and tile floor maintenance. Details given on 21 in. unit that vacuums floors, then waxes and buffs them. 20p. —*G. H. Tennant Co., Minneapolis, Minn. (203R)*

Deburring, Polishing Kit

Details of a 24-unit, abrasive kit containing wheels, cones, blocks, and mandrels for smoothing, deburring, and polishing operations. Form 211, 2p.—*Cratex Mfg. Co., San Francisco. (203S)*

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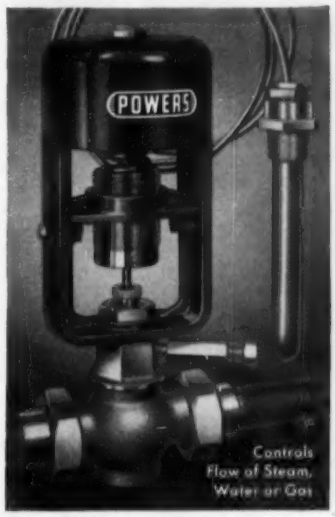

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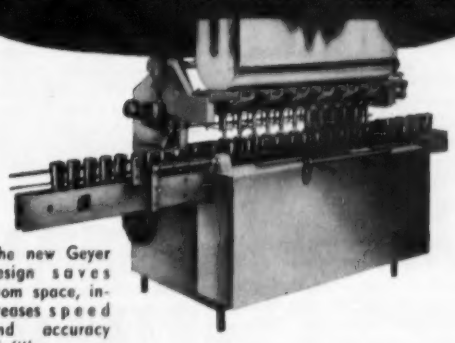

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WITH THIS NEW GEYER STRAIGHT LINE FILLER

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- **fills as many as 300 glass, plastic and metal containers a minute.**
- **provides greater accuracy of fill since air operated valves cut off instantaneously. Valves themselves are completely air free.**
- **no container, no fill feature. Valves operate only when containers are at the filling station.**
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Pipe & Wire Markers

Two bulletins describe pressure sensitive tapes used to identify wire and pipe lines. Tape furnished in various colors and resistant to heat, cold, humidity, and vibration. 8 & 4 p.—*North Shore Nameplate, Inc., Bayside, Long Island. (204A)*

Corrosion Control

Company publication, *Corrosion Control Reporter*, describes problems and methods of applying vinyl mastic to metal fabrications for prevention of corrosion. 12p. —*Amercoat Corp., South Gate, Calif. (204B)*

Plastic Packing

Information on a plastic material available in bulk or molded forms for gaskets and pump packings. It is said to be temperature resistant and inert, thus suitable for hot, caustic pumping conditions. 12p.—*Chemical & Power Products, Inc., New York City. (204C)*

Small Part Storage

Treats of plastic-fronted drawer-cabinets for visible storage of small parts. Other storage and materials handling equipment also listed. 16p.—*General Industrial Co., Chicago. 204D)*

INSTRUMENTS

Dial Thermometers

Bulletin contains sizes, ranges, and prices of line of fixed, dial thermometers.—*Weston Electrical Instrument Corp., Newark, N. J. (204E)*

Viscosity Measurement

Operation data and installation facts related in bulletin on torque-type viscometer. Unit said to measure wide range of materials, have high corrosion resistance, and be easy to clean. 4p.—*Brookfield Engineering Laboratories, Inc., Stoughton, Mass. (204F)*

Liquid Meter & Proportioners

Tells of German-made rotary piston-type meters and proportioners designed for accurate measurement of milk and other liquids. Preset units are very easy to clean and have slow-down feature before shut-off, to minimize line shock. Two bulletins, 10p.—*Technical Export Assoc., New York City. (204G)*

Proportioning System

New information on remote dialing and weighing of up to 30 different ingredients. Three applications discussed with photos and drawings. Bulletin 0155, 8p. —*Richardson Scale Co., Clifton, N. J. (204H)*

Liquid Gage Illuminator

Details of plastic-wedge illuminator, said to provide even lighting for liquid level gages. Explosion-proof models available. 2p.—*Jerguson Gage & Valve Co., Somerville, Mass. (204I)*

Control Systems

Contains description, charts, and functions of d-c amplifying units used for precise temperature control and standardization of instruments. Bulletin B-36-A-3-55, 12p. —*Weston Electrical Instrument Corp., Newark, N. J. (204J)*

Accurate Pan Scales

Data on fractional ounce, over-and-under pan scales for accurate product weight determinations.—*Exact Weight Scale Co., Columbus, Ohio. (204K)*

Glass-Sealed Switch

Booklet covers operation and performance of a glass-sealed, magnetic current switch, used in counting, position indicating, and sensitive relaying. Bulletin 1057, 20p.—*Revere Corp., Wallingford, Conn. 204L)*

Remote Thermometer

Tells about electric thermometer station with up to fifty positions. Unit will handle readings from as far as 1000 ft. in ranges from 100 to 400 deg. F. Bulletin 1465, 1 p.—*Illinois Testing Laboratories, Inc., Chicago. (204M)*

Damper Control

Automatic indicating, furnace damper control detailed, with operating principles explained in picture and diagram. Bulletin 7404, 4 p. — *Minneapolis-Honeywell Regulator Co., Philadelphia. (204N)*

Dry-Material Feeder

Concerns a loss-in-weight gravimetric feeder, said to be accurate within 1% by weight, which feeds powdered, granular or lump material from 1 to 4,000 lb. per hr. Bulletin 30-H12A, 4 p.—*Omega Machine Co., Providence. (204O)*

Pneumatic Controller

Covers features of new pneumatic indicating controller with more readable scale, on-off scale, and proportioning from .25% to 25% of scale range. Bulletin 5A-13, 12 p.—*Foxboro Co., Foxboro, Mass. (204P)*

Electrical Weighing

Literature details method of weighing loads and measuring forces by use of load cells and beams employing changes in electrical resistance. Bulletin 4301, 20 p.—*Baldwin-Lima-Hamilton Corp., Philadelphia. (204Q)*

Temperature Control

For use on ovens, baths, dryers, and ducts, this compact indicating temperature control comes in ranges from 30 to 750 deg. F. Leaflet gives details.—*Burling Instrument Co., Chatham, N. J. (204R)*

MATERIALS HANDLING

Package Handling Systems

Facts given for power-belt and gravity, package-handling systems in portable and permanent arrangements. Bulletin 400.—*A. B. Farquhar Div., Oliver Corp., York, Pa. (204S)*

Rubber Belting

Descriptions of regular and specially compounded rubber belts, in several colors, for handling food products. Catalog 3679.—*Thermoid Co., Trenton, N. J. (204T)*

Semi-Automatic Palletizer

Details on one-man palletizing machine. Operator sets pattern on roller feed table, unit stacks cases and discharges full pallet. Adjustable for different standard pallet sizes.—*J. W. Greer Co., Wilmington, Mass. (204U)*

Fork Truck Models

Three bulletins relate features of 2000, 3000, and 4000 lb. capacity electric, stand-up fork trucks. Telescopic lifts available to 144 in. Equipment is said to be highly maneuverable in narrow aisles. Bulletins 5111, 5112, and 5113.—*Yale & Towne Mfg. Co., Philadelphia. (204V)*

Portable Loading Dock

Concerns features of a portable, hydraulic loading dock that raises or lowers 6000 lb. loads, 56¼ in. Platform hinges for compact storage. Remote control button for self-contained hydraulic system makes for easy operation. Bulletin 151, 4p.—*Raymond Corp., Greene, N. Y. (204W)*

Automatic Warehouse

Basic design and operation of electronically-controlled warehouse conveyor system explained and pictured (FE May '55, p. 207). 4p. —*Walter Kidde Constructors, Inc., New York City. (204X)*

Weighing-Handling System

Leaflet relates features of unique weighing-handling system where materials move in suspended hoppers. Special monorail section does the remote weighing. Brochure 54F, 1p.—*Richardson Scale Co., Clifton, N. J. (204Y)*

Multi-Use Tractor

Rubber-tired tractor shown with a variety of attachments that scrape, shovel, tow, and handle materials. 48p.—*Frank G. Hough Co., Libertyville, Ill. (204Z)*

Container Handling

Concerns auxiliary filler equipment for handling and cleaning glass containers. Bulletin 157.—*Horix Mfg. Co., Pittsburgh. (204AA)*

Stair-Climbing Hand Truck

Contains information and diagrams to illustrate ratchet powered hand cart that climbs stairs. 4p. —*Valley Crafts Products, Inc. Lake City, Minn. (204AB)*

Pneumatic Conveying

Article reprint discusses advantages of sugar handling by pneumatic conveyor system.—*Fuller Co., Catasauqua, Pa. (204AC)*

Fork Truck Attachments

Informs on barrel clamp attachment for fork truck capable of lifting from one to six barrels. Other clamps, plows, and booms illustrated. 10p.—*Iron Works, Inc., Brooklyn, N. Y. (204AD)*

Bulk Conveyors

Installation pictures and equipment diagrams show wide line of V-trough and belt conveyors for bulk transfer. 12p.—*Jervis B. Webb Co., Detroit. (204AE)*

PROCESSING

Liquid Fillers

Brochure considers line of rotary plunger fillers, in 12 different models. Fill liquid and semi-liquid packaging needs.—*W. F. & John Barnes Co., Rockford, Ill. (204AF)*

Aluminum Containers

Catalog illustrates aluminum-constructed pans, wheeled tanks, and nesting drums for food materials.—*Aluminum Cooking Utensil Co., Inc., New Kensington, Pa. (204AG)*

Mixing Kettles

Specifications and diagrams inform on line of mixing kettles featuring scraper-agitator that covers entire inside kettle sides. Made in stainless steel, nickel, and monel. Bulletin LM-2, 4p.—*Lee Metal Products Co., Philipsburg, Pa. (204AH)*

Vacuum Lug Capper

Facts on use of vacuum lug caps, with details on capping machine and capping speeds for various sized jars. 8p.—*Crown Cork & Seal Co., Inc., Baltimore. (204AI)*

Bag Weigher & Filler

Sheet gives data and illustrations for manual filler and weighing scale used in bagging dry, ground materials. Equipment has automatic cut-off and fills textile or multi-wall paper bags. Sheet 5301.—*Richardson Scale Co., Clifton, N. J. (204AJ)*

Aluminum Kettles

Catalog of aluminum alloy kettles, urns, and other vessels for industrial use. Also, line of processing cutlery. Catalog 66-B, 68p. —*Aluminum Cooking Utensil Co., New Kensington, Pa. (204AK)*

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Packaged Plate Freezers

Facts on self-contained, 6- to 20-station plate freezer units. Use ammonia, brine, or Freon refrigerants. 2p.—*American Plate Freezer Corp., Boston. (205A)*

Dryer Design

Engineering service offered for design of special dryer installations. 4p.—*C. G. Sargent's Sons Corp., Graniteville, Mass. (205B)*

Filter Fabrics

Use of synthetic fibers in filter fabrics discussed. Felted material is available in 10 different grades to meet wide range of applications. Data table included. 6p.—*Brosites Products Corp., N. Y. C. (205C)*

Filtering & Mixing

Catalog illustrates and details line of stainless steel filters, mixers, pumps, and tanks. Disc-filters and pumps can be mounted on wheeled stand for easy portability. Tanks feature various accessories. Propeller mixers come in portable or fixed models. 32p.—*Alsop Engineering Corp., Milldale, Conn. (205D)*

Spray Drying Equipment

Full facts on 5-model line of spray dryers, ranging in capacity from 300-1500 lb. non-fat milk per hour. Features are said to be low-cost operation, compact size, and easy cleaning. 10p.—*Blaw-Knox Co. Inc., Dairy Equip. Div., Mora, Minn. (205E)*

Spray Dryer

Facts given for operation of compact, gas-fired spray dryer available in 3 models for quick or slow-drying materials. Bulletin 36, 4p.—*Bowen Engineering, Inc., North Branch, N. J. (205F)*

Automatic Roll Machine

Dimensions and pictures illustrate operation of automatic roll forming machine with continuous dough feed. Runs up to 250 pieces per min. 4p.—*American Machine & Foundry Co., New York City. (205G)*

QUALITY CONTROL

Vegetable Oil Refractometer

Considers features of horizontally loaded, easy cleaning refractometer for testing vegetable oils. Said to be accurate to 0.1 Butyro number. Bulletin D-273.—*Bausch & Lomb Optical Co., Rochester, N. Y. (205H)*

Taste Panel Service

Booklet informs on the sensory panel technique for evaluating flavor and odor problems in food products. Booklet F6, 8p.—*Evan Research & Development Corp., New York City. (205I)*

Lab Apparatus

Spring issue of catalog supplement lists 27 new items in laboratory equipment, ranging from a distillation column to pipettes and a spectrophotometer. Bulletin 23, 20 p.—*Scientific Glass Apparatus Co., Bloomfield, N. J. (205J)*

Portable Refrigeration

Details of a portable, caster-mounted refrigeration unit for reduced temperature studies. Other items listed, include timers, glassware washers, and a temperature controlled oven. Book 2, 16p.—*A. Daigger & Co., Chicago. (205K)*

Cheese Color Standards

Describes National Cheese Institute color reference standards, consisting of 10 clear lucite panels in tinted shades, for color control in cheese processing. 6p.—*Milprint, Inc., Milwaukee. (205L)*

Research Aid

Full details on compact new spectrophotometer and recorder for fast quantitative and qualitative analysis in control and research work. 20p.—*Warren Electronics, Inc., Bound Brook, N. J. (205M)*

PACKAGING

Packaging Machines

Photos and diagrams give facts on line of net weighing and packaging machines. 13 p.—*Triangle Pkg. Mach'y. Co., Chicago. (205N)*

Carton Former

Describes a thermo-carton former, used for bakery products. Machine uses a rope-like glue, said to eliminate starting warm-up. —*Package Machinery Co., East Longmeadows, Mass. (205O)*

Sheeting & Tubing Guide

Handy pocket folder gives linear inches per lb. of standard widths of polyethylene plastic tubing. Also, gives yield in square and linear yards of sheeting.—*Durethene Corp., Chicago. (205P)*

Lithographed Cans

Use of colorful lithographed cans for packaging covered.—*Continental Can Co., New York City. (205Q)*

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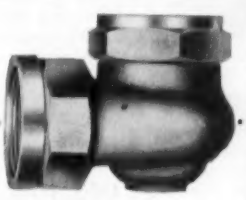

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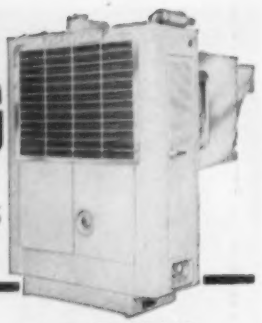

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Stapling Machine Line

Air-powered, portable and fixed stapling machines are detailed, with pictures. Units close filled cases and install on conveyor tracks. 32p.—*International Staple & Machine Co., Herrin, Ill. (206A)*

Taping Machine

Data on manual taping machine that bands various-sized containers together for premium sales. 2p. —*Dellenbarger Machine Co., Inc., New York City. (206B)*

Bag Packaging Machines

Series of brochures detail construction of plastic bag packagers with fine powder to lump-solid filling applications.—*Package Machinery Co., Springfield, Mass. (206C)*

Frozen Food Cartoner

Line of equipment for forming and closing retail and institutional frozen food cartons. Coding attachment available. Specifications given. 24p.—*Kliklok Corp., New York City. (206D)*

INGREDIENTS

Citric Acid

For even acidity in product, anhydrous citric acid is described as retaining full strength over months of storage. Bulletin F-590. —*Chas. Pfizer & Co., Inc., Brooklyn. (206E)*

Flavors & Bases

Prices listed for wide line of flavors, bases, concentrates, and certified colors. Catalog 1953, 20p. —*Dodge & Olcott, Inc., New York City. (206F)*

Gums & Stabilizers

General catalog contains section devoted to gums and stabilizers for use in food industry. 24p.—*Jacques Wolf & Co., Passaic, N. J. (206G)*

Propylene Glycol

Use of propylene glycol as a solvent and humectant detailed, with physical and chemical data given. Folder F-8738, 16p.—*Carbide & Carbon Chemicals Co., New York City. (206H)*

SANITATION

Dust Collector

Helical flow of contaminated air in unit "centrifuges" dust particles out. Photos of equipment. 5 p.—*Dustex Corp., Buffalo. (206I)*

Copper & Stainless Cleaner

Report indicates ease of stain and discoloration removal from copper and stainless steel equipment, without scratching.—*Oakite Products, Inc., New York City. (206J)*

Dairy Cleanup Chart

Wall chart gives procedures and chemicals for use in dairy cleanup program.—*Oakite Products, Inc., New York City. (206K)*

Ammonium-Salt Germicide

Considers bacteriological, chemical, and physical properties of quaternary ammonium salt used for slime control in food palnts. Bulletin 45, 14p.—*Emulsol Chemical Corp., Chicago. (206L)*

Pilot Model Autoclave

Data sheet depicts 10-gal. pilot sized autoclave. Photos and drawing.—*Patterson-Kelley Co., Inc., East Stroudsburg, Pa. (206M)*

Chelated Detergents

Pocket folder reviews advantages of two alkali bottle washing compounds. Gives information on their use.—*Diamond Alkali Co., Cleveland. (206N)*

MANAGEMENT

Industrial Research

Industrial research activities available on subjects ranging from engineering psychology to bearings. —*Franklin Institute, Philadelphia. (206O)*

Lab Planning

Simplified drawing kit offered for planning pre-fabricated sectional lab, with dimensions and illustrations. Includes catalog SD-3 —*Metalab Equipment Corp., Hicksville, Long Island, N. Y. (206P)*

Visible Filing Systems

Plastic holders, staggered for complete visibility, are a feature of compact vertical filing system. Full details.—*Vue-Fax Corp., Westbury, N. Y. (206Q)*

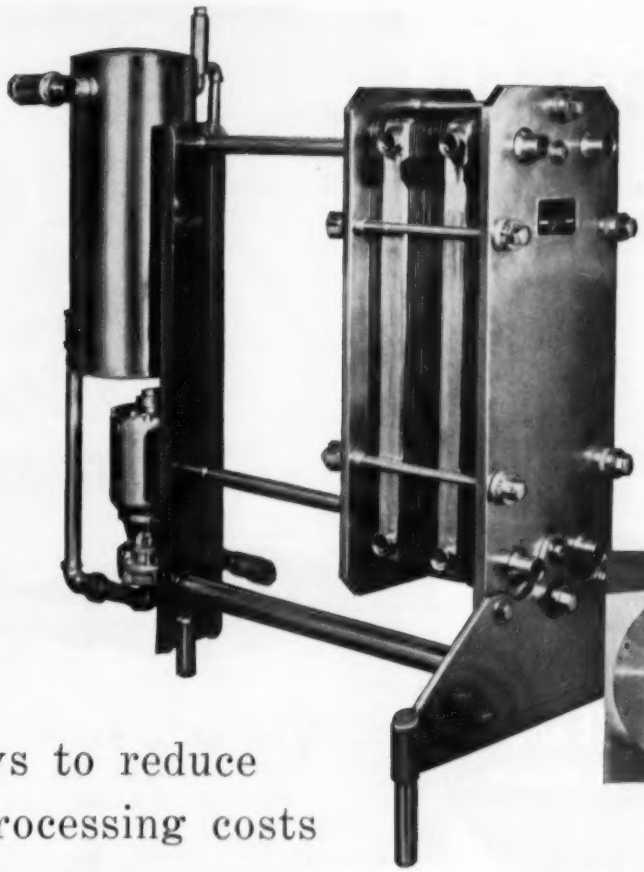
TRANSPORTATION

Dry-Ice Refrigeration

Performance charts and illustrations tell story of dry-ice refrigeration in trailer bodies. Unit fits in nose, has forced draft circulation. 6p.—*Hunter Mfg. Co., Cleveland. (206R)*

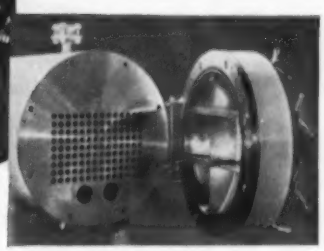
Cab-Over-Engine Trucks

Details of cab-over-engine trucks in 20,000-28,000 lb. class, and tractors in 40,000-53,000 lb. class. Cab lifts with hydraulic pump for easy engine maintenance.—*Mack Trucks, New York City. (206S)*



Left: Sani-Plate Heat Exchanger, designed for flash pasteurization of syrups, juices, vinegar, etc.

Below: Pfaudler high-speed tubular cooler is designed for cooling wort and products of similar viscosity.



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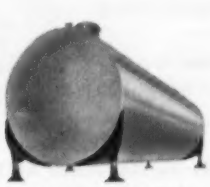

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Upstate New York prepared bulk mix manufacturer for the baking industry has opening for experienced food technologist. Send complete details of experience, age, and salary expected. This is our first ad for this position. P-6786, Food Engineering.

POSITIONS WANTED

Plant or Production Mgr, food processing or allied industries. Experienced production, engineering, purchasing, some sales. Grad engineer. Excellent health. PW-6598, Food Engineering.

Food Technologists-Executive. B.S., M.I.T. 12 yrs. varied responsible experience in quality control, new product development, administration, advertising, packaging, and merchandising. Seeks greater opportunity than at present. PW-6696, Food Engineering.

Production Man—exceptional, capable technologist and plant supervisor with extensive manufacturing experience frozen foods and related specialty fields desires suitable connection. Good right hand man for top executive. Will relocate. PW-6909, Food Engineering.

Chemist Production man, experienced maraschino cherries, glace fruit, juices, preserves, flavors, beverages, canning and freezing, poultry, pies, now available. PW-6953, Food Engineering.

Administrator-Food Technologist, B.S., M.B.A., 33 married, veteran. Thoroughly familiar with all phases of production and quality control, product development, sanitation, cost studies. 8 years experience. Presently assistant general manager food processing firm. Will relocate. PW-6956, Food Engineering.

Management position in canning or freezing. Have graduate degrees food technology. Seventeen years experience includes plant and lab work and management of research and production in processing and packaging fruits, vegetables, meats, and dairy products. Also experienced in development and production operation of aseptic canning. PW-6835, Food Engineering.

Food-Confectionery Chemist, Ph.D.—Desires. responsible position development-technical service. 8 years diversified experience: confectionery development and evaluation, flavors, organic and biochemical research. Now quality control supervisor, liaison with consultants and suppliers. Publications, societies, 36, family. PW-6757, Food Engineering.

Biochemist—Ph.D. Desires research or quality control position in food industry. Available immediately although now employed. Director quality control for franchise beverage company last ten years. Previous experience in college teaching (Biochemistry, food, organic) and research on animal nutrition. Publications—research, college text, laboratory manual. PW-6966, Food Engineering.

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Large established meat packing corporation require services of engineers both Chemical and industrial, for supervisory and/or development work in Argentina and Brasil. Good opportunity for right men, necessary to have degree or equivalent plus experience. Age limit under 40.

P-6969, Food Engineering
520 N. Michigan Ave., Chicago 11, Ill.

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Wanted: Your Idle Machines or Plants

Send List Today

Our 38th Year

CONSOLIDATED

PRODUCTS COMPANY, INC.

56 BLOOMFIELD STREET
HOBOKEN, NEW JERSEY

Tel.: HO 3-4425 N. Y. Tel.: BA 7-0600

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Premier 8" SS Colloid Mill, 30 HP mtr.
Phila. 2 piston S/S Filler, like new
Pneumatic Scale Labeler, ser 9894. Like new.
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MRM S/S 12 spt. Rotary Vac. Filler
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S/S Pasteurizer, 200 gal. Jktd. & Agtd.
Day 70 cu. ft. Jktd. Spiral Mixer
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What Have You For Sale?

YOU CAN BANK ON

EQUIPMENT CLEARING HOUSE, INC.

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SOuth 8-4451—4452—8782

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Centrifugals: Fletcher 12" copper, 17" stain. steel, 20" lithcoated, Tolhurst 26" copper.
Clarifiers: De Laval model 84-51.
Collectors, dust: bag 5" dia. x 2½' to 5' long, steel.
Condensers: stainless steel and copper.
Conveyor Tables: belts from 5½" wide x 12' long and up.
Cutters, silent: Buffalo 32" and 43".
Dicer: Sterling model EMIC-1/N2.
Dryer: Devine 2 x 4' vac. drum, st. steel.
Dryers: vacuum shelf, Stokes 20 shelf, Devine 10 shelf.
Extractor: Troy 26" monel basket.
Feeders: Syntron F-22, 10 x 36" trough.
Fillers, liquid: Peerless 6 valve, Cass gross weight, siphon and vac. types.
Fillers, piston: Stokes, Colton, Elgin, Filler Machine Co. for jars, tubes.
Fillers, powder: Speedee, Triangle, Stokes & Smith, Ferguson.
Filter Presses: Sperry, Shriver 6"-36", recessed and plate and frames types.
Filters: int. pressure — Alsop, Sparkler, Lomax, Industrial, Sweetland.
Filter, vacuum: Oliver 2½x1', Denver 1x3'.
Fryolators: Pitman gas fired, 18" well.
Kettles: Stainless steel 5 to 150 gal., with and without agitators, aluminum 40 to 100 gal.
Labelers: Burt, Knapp, New Jersey, World, Ermold—auto. and semi-auto.
Mills, attrition: 30" 40 hp.
Colloid: Charlotte 3 hp., Premier 3 hp.
Hammer: Mikro 1SH, 2DH, 2TH, Gump #1, Prater, Raymond, Jay Bee, Jeffrey 30 x 24", Williams #2 and BX. Fitzpatrick Homoloid model J.
Mixers: Dough type single and double arm, 5 to 100 gal.
Powder: 50 to 2000 lb. capacity.
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Pasteurizer: Wallace-Walker plate type, 200 GPH., st. steel.
Peeler: Blakeslee model SN-27146.
Press: Davenport continuous #3A.
Pumps: Centrifugal, rotary, gear, vacuum, all types and sizes.
Retorts: 42 x 72" and 24 x 30".
Screens: Rotaex 20 x 48", 42 x 84". Roball 40 x 120" stainless steel. Selectro 4 x 10', Abbe Blutergess #1.
Sealers, carton: Standard-Knapp, Ceco, Triangle, Packomatic.
Sterilizers: Climax 20" x 36" jacketed.
Still, vacuum: 500 gal. stain. steel.
Tanks: Glass lined, various sizes. Stain. steel 25 gal. to 1200 gal.
Viscolizer: 150 gal. Cherry-Burrell.

KETTLES, Green stainless steel 125 gal. 48 x 25", 150 gal. 50 x 26", 45 lb. full jacket, pedestal type, with covers and valves.

Send us your inquiries and list of idle equipment.

LOEB EQUIPMENT SUPPLY CO.

820 West Superior St. **Chicago 22, Ill.**
Telephone: Seeley 8-1431 **Our 31st Year**

REPLIES (Box No.): Address to office nearest you
NEW YORK: 330 W. 42nd St. (36)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

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WANTED

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Chemical & Process Machinery Corp.

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SCALES
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2—#12 Sweetland Filters—46 & 55—304 S.S. leaves and fittings.
6—Sweetland Filters #3, #5, #7, #10, #12.
1—Link Belt 3' 10"x16' Steel Roto-Louvre Dryer.
1—Link Belt 6' 4"x24' Hersite coated Roto-Louvre Dryer.
2—Struthers Wells 5'x15' nickel Rotary Vacuum Dryers.
1—Hietz Mfg. Co. 20' "Thermoscrew" Screw Conveyor Dryer 304 S.S.
5—Day Cincinnatus Sigma Blade Mixers, 660, 250 & 100 gal.
2—Buflovak 6'x5' 6" Monel, Single Drum Flakers.
1—Struthers-Wells 350 sq. ft. S.S. Heat Exchanger.
2—3TH, 4TH, Mikro Pulverizers.
4—Rotex Double Deck Sifters 40"x120", 40"x84".

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209-289 Tenth St., Brooklyn 15, N. Y.
ST. 8-4672

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(1) Conkey Triple Effect Evap., Herculoy tubes, etc.
1st eff: 500 sq. ft.
2nd eff: 700 sq. ft.
3rd eff: 700 sq. ft.
Built 1945—NEVER USED

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2nd, 3rd & 4th eff: 1775 sq. ft. ea.
Built 1946—Used about 2 years

IN STOCK

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25 Stainless Steel and Stainless Clad Steam Jktd. Kettles from 40 gal. to 500 gal.

PERRY
EQUIPMENT CORP.
1411 N. 6th St. PHILA. 22, PA.

All items listed subject to prior sale or use by Eli Lilly and Company.

9 Podbielniak, Type 316 S.S. centrifugal, multistage, counter-current liquid-liquid solvent extractors. 1 Serial # 6060, 8 Serial #6070, Engineering data available. Original cost 1947—$12,500 ea. Used. PRICE $2,500 ea.

1 Buffalo Vac 12" x 18" Drum Drier S.S. Blade and Drum. Used. PRICE $1,500

3 Devine single door vacuum shelf driers. 6 shelves, 9" apart. 80 square feet effective pan surface. Drawing available. Replacement cost $5,500 ea. New. PRICE $2,500 ea.

1 Dean Brothers Pump 7 x 7 x 10 Duplex Double Acting Piston Type Pump. Durable S.S. Valve Service. Replacement cost $1,200. New. PRICE $600

3 Polar Stills, 3 Rotameters, 1 Tapered Tantalum condensor, 1 Copper condensor 24 square feet, 1 Tilting Kettle on casters 200 gallon.

All items F.O.B. Indianapolis

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MElrose 6-2211

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100 gal. Copper Steam Jacketed Mixing Kettle
York Freon Compressor with 1½ HP 3 phase motor
Burns Split Nut Peanut Blancher

SAVAGE BROS. CO.
2636 Gladys Ave. Chicago 12, Ill.

FOR SALE

75 gal. Monel Jkt. Kettle, 39" x 27", agit.
100 to 300 gal. S.S. Mix Tanks, water jkt.
225 gal. S.S. Closed Tanks, Insul., 38" x 46".
300 gal. Horiz. S.S. Tank, 3' x 7', agit.
650 gal. Horiz. S.S. Tank, 4' x 7'.
1,000 gal. Horiz. S.S. Tank.
36" & 60" S.S. Vacuum Pans.
Double Effect S.S. Evaporator.
48" & 60" Centrifugal Extractors, S.S.
28" Centrifugal Extractors, 3 H.P.
Buflovak S.S. Spray Dryer, 500 lb. per hr.
36" x 84" & 42" x 120" Double Drum Dryers.
75 to 1,500 gal. Homogenizers or Viscolizers.
3 H.P. Freon Compressor Unit.
3,000 gal. Glass Lined Tanks, Insul.
3- #100B Waukesha Pumps, 1 H.P.
Milk Pasteurizers, Coolers, Fillers, Washers.

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Standard-Knapp No. 429 Carton Sealer.
Hayssen; Package Machy. Co. FA, FA4, DF, CA2; Miller, Scandia and Oliver Automatic Cellophane Wrappers.
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Hudson Sharp Campbell Auto. Cellophane Wrappers, Models 2W8 and 2W10.

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Burt AUB Wraparound Labelers, 1 gal.
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F. J. Stokes Models E and RBB Tablet Machines.
Colton 2, 3RP, 5½ T Tablet Machines.
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74 cubic foot size
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4-Ton Capacity, 4800 c.f.m.
Also—Two Ten-Ton Units, 10,000 c.f.m.
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Need One Wolf Or Huhn
STARCH DRYER AND COOLER
Copper Steam Jacketed Kettles 38" Wide, 30" Deep.
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2—Pfaudler G.L. Reactors 100 & 500 gal.
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8—Filter Presses 18" to 42" C.I. Plate and Frame
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1—Feinc 6' dia. S.S. Filler—24 Sq. Ft.
1—Feinc 3' x 1' S.S. Rotary Vac. Filter
1—Buflovak 6' dia. Vac. Crystallizer
1—Double Drum Dryer 4' x 9'
8—Devine #27 and 28 Vac. Shelf Dryers
10—Ribbon Mixers 200 to 4000# Cap.
1—Stainless Steel 1800# Spiral Mixer
3—N.J. 86-TO Label-Dri Labelers
1—Stokes B-2 Rotary Tablet Machine
1—Colton #3 Rotary Tablet Machine
1—Stokes DD-2 Rotary Tablet Machine
2—Transwrap Model B Fillers & Sealers
NEW S.S. Kettles—Tanks—Mixers

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GRamercy 5-6680
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STOKES & SMITH model HG84, Twin Auger Filler with Vacuum Attachment, Also Models G and GD.

Partial List—send for complete list of equipment in stock

WANTED

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ALLIED EQUIPMENT CO.
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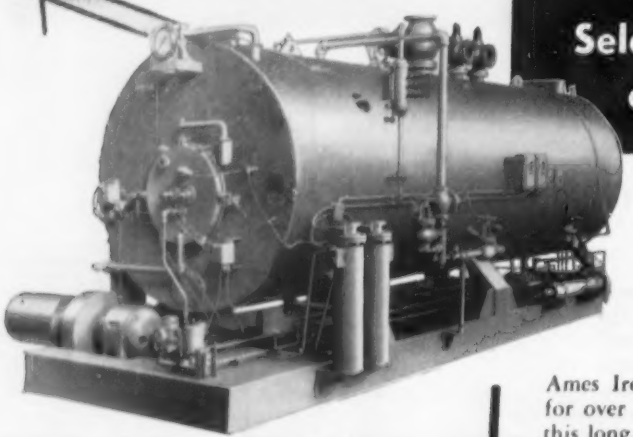

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